THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVI. No. 1431.] LONDON, OCTOBER 14, 1890. [42ND YEAR. Price 6d.

WOLSTON'S Paste and Ready Mixed for Use.

Guaranteed Free from Adulteration. **TORBAY PAINTS.**

FOR GASHOLDERS, &c., &c.

The Original "Torbay Paints"
As supplied during the present and many preceding years to the LONDON GASLIGHT & COKE COMPANY.

Special Quotations to Gas Companies.

TORBAY & DART PAINT Co., Ld.,
23, Gt. George St., Westminster, S.W.
Works: DARTMOUTH, DEVON.

— ESTABLISHED 1830. —
PARKER & LESTER,
Manufacturers & Contractors.

THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:
ORMSIDE STREET, OLD KENT ROAD, LONDON.

Ashmore, Benson, Pease, & Co., Ld.,
STOCKTON-ON-TEES,
Manufacturing Gas Engineers.
See Advertisement, p. 820.

CEMENT
EARLE'S
BEST
Portland Cement
MANUFACTURED BY
GEO. & THOS. EARLE,
HULL.

Office: 7, PIER STREET.
Works: WILMINGTON.
STOREAGE CAPACITY 10,000 Tons.

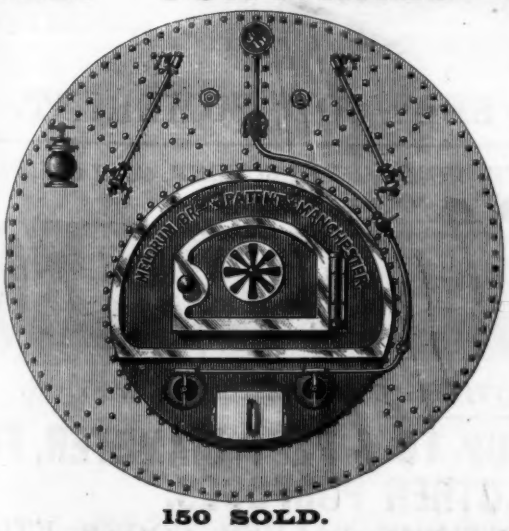
ESTABLISHED 1811—OVER THREE QUARTERS OF A CENTURY.
Telegraphic Address: "CEMENT HULL."

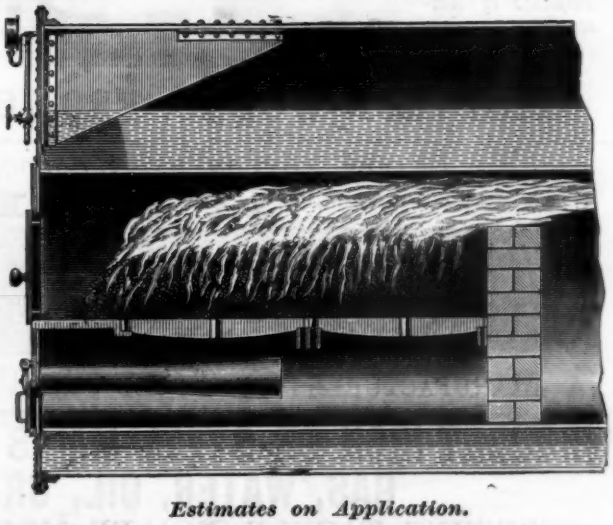
J. UNGAR & CO.,
Manufacturers & Patentees of every Description of
IMPROVED LAMPS
FOR
Streets, Markets, Shops, &c.

WHOLESALE DEPOT: 52, COMMERCIAL ST., LONDON, E.

We specially solicit Government and Local Board Contracts for General Lighting.

SELF-CONTAINED DUST FUEL FURNACE.





150 SOLD.

Estimates on Application.

MELDRUM BROS.,
26, HALF STREET, CATHEDRAL YARD, MANCHESTER.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER & BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM

(ESTABLISHED 1765),

MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

TELEGRAPHIC ADDRESS: "COCKEY'S FROME."

EDWARD COCKEY & SONS, Ld.,

ESTABLISHED OVER HALF A CENTURY.

Gas Engineers and Contractors for the Erection of Gas-Works.

MANUFACTURERS OF IMPROVED GAS-EXHAUSTING APPARATUS.

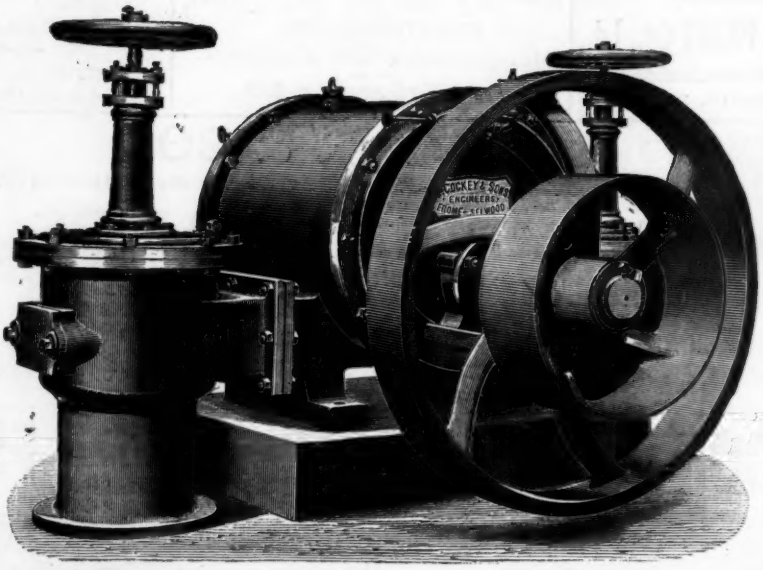
A Large Stock of Valves always on hand.

Lamp Columns; various patterns.

Wood Grids for Purifiers and Scrubbers.

Castings of every description.

Apparatus for the manufacture of Sulphate of Ammonia.



Experienced Retort-Setters constantly employed.

Lead Burning and Plumbing in all its Branches.

Gas-Fittings in great variety.

Brass Castings.

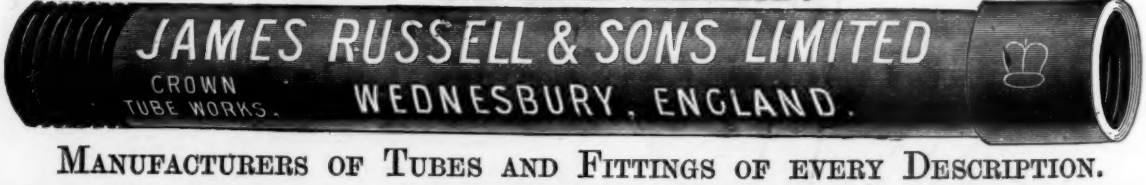
Patent Washers and Valves.

Boilers and Engines.

THE IRON-WORKS, FROME SELWOOD, SOMERSET.

HIGHEST AWARDS—LONDON, PARIS, COLOGNE, VIENNA, MELBOURNE, AND OTHERS.

—11 MEDALS.—



MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

SCREWING TACKLE, BOILER MOUNTINGS, VALVES, COCKS, ETC.

LONDON: 108, Southwark Street. BIRMINGHAM: 114, Colmore Row. LEEDS: 6, Mark Lane, New Briggate.

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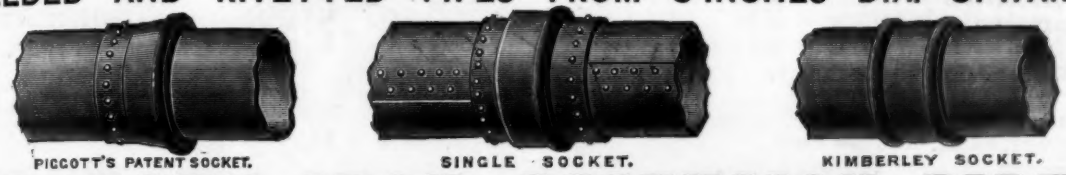
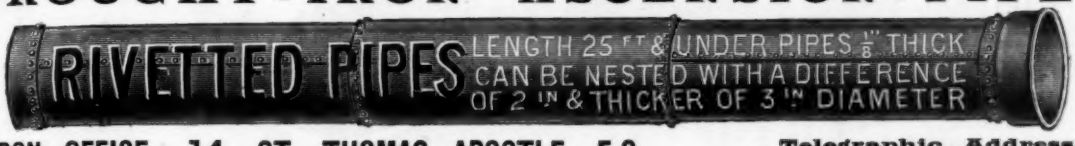
WELDED AND RIVETTED PIPES FROM 8-INCHES DIA. UPWARDS.



WROUGHT-IRON ASCENSION-PIPES.



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ESTABLISHED 1825.

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MANUFACTURERS OF EVERY DESCRIPTION OF

IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES

FOR ANY PURPOSE.

NEWTON, CHAMBERS, & CO., LIMITED,

THORNCLIFFE IRON-WORKS, near SHEFFIELD,

MANUFACTURERS OF

SLIDE VALVES, WITH RACK & PINION, OR Internal or External SCREWS, of all Sizes.

GASHOLDERS, AND Gasholder Tanks.

CAST-IRON RETORTS,

RETORT-BED FITTINGS,

And Retort-House Appliances

of every description.

Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.

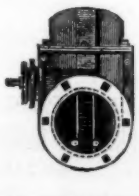
WROUGHT AND CAST IRON CONDENSERS, SCRUBBERS, & WASHERS,

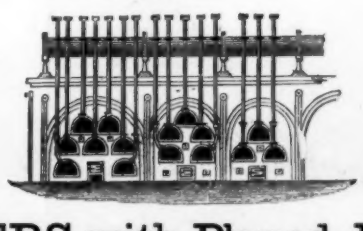
TAR AND LIQUOR PUMPS, &c.

PATENT CENTRE VALVES

for working Purifiers.

Also Bye-Pass & Stop Valves.





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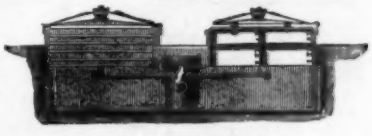
HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS,

WOOD GRIDS.

CAST AND WROUGHT IRON TANKS AND CISTERNS.



DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

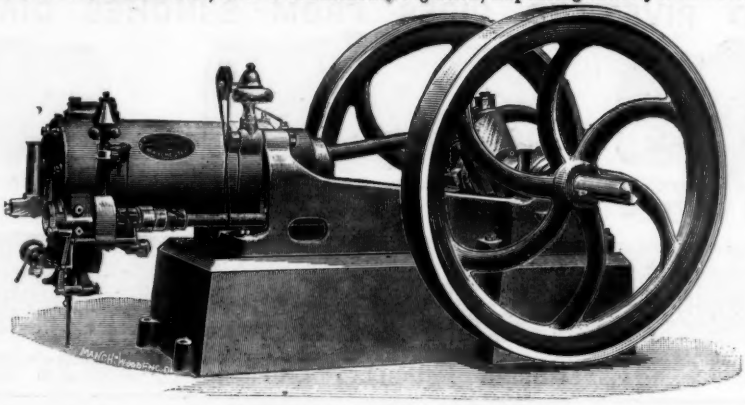
Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINE.

100 Prize Medals.

New 14-H.P. Nominal Size, fitted with Patent Tube Ignition, dispensing entirely with Plates.



MADE in SIZES
2-Man to 100-HP.

GAS-ENGINES
COMBINED
WITH
PUMPS
FOR
TOWNS SUPPLY,
SEWAGE, &c., &c.

GAS-ENGINES
COMBINED
WITH
AIR COMPRESSORS
FOR THE
SHONE SEWAGE
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LIGHT, &c.

MADE in SIZES
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VERTICAL
AND
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TYPES.

ENGINES
COMBINED
WITH
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Largely used for
EXHAUSTING,
PUMPING,
COKE CRUSHING,
ELECTRIC LIGHTING,
&c., &c.

Over 31,000 "OTTO" ENGINES are at work.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER,

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LIVERPOOL,
GLASGOW,
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BIRMINGHAM,
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HARRIS & PEARSON,

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MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

GEORGE ORME & Co., Atlas Meter Works, OLDHAM.

Manufacturers of

IMPROVED
WET AND DRY
GAS-METERS,
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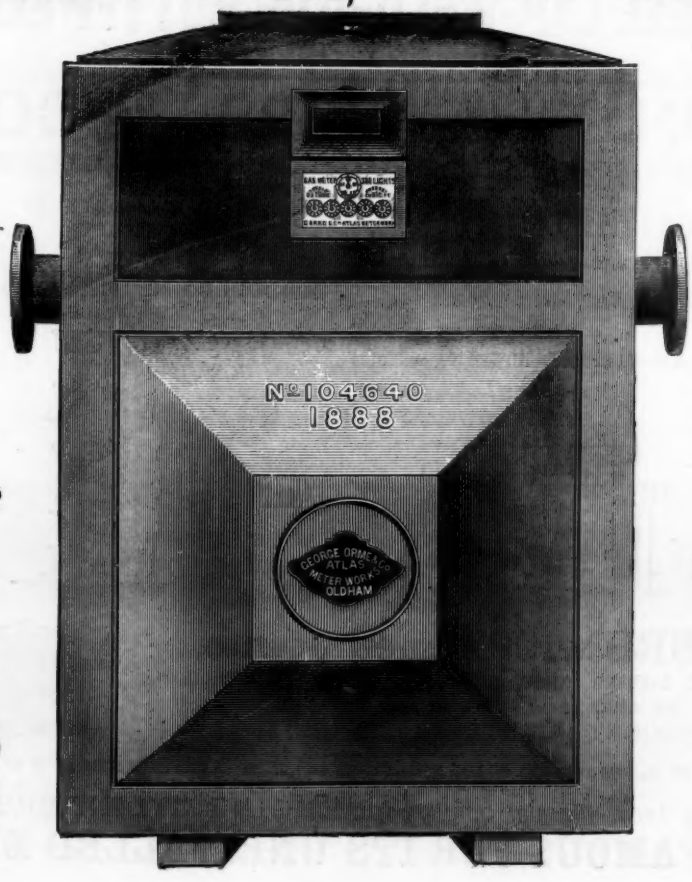
LAMP METERS.

PRESSURE GAUGES.

IMPROVED STREET
LANTERNS
of New Designs.

LAMP TORCHES.

GAS, WATER, AND
STEAM FITTINGS
of all kinds.



ORME'S
GAS REGULATOR
(BEHL'S PATENT)
for Street Lamps.
Over 150,000 now in use.
Adopted by the Leading Gas Companies and Corporations.

ORME'S
GAS REGULATOR
(BEHL'S PATENT)
for Domestic Use.

COLE'S PATENT
SUSPENSION REGULATOR
for Regenerative Lamps, &c.

Illustrated Price Lists upon application.

Telegraphic Address:
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Telephone No. 93,
OLDHAM.

JOHN HALL & CO.,

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MANUFACTURERS OF FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

A STOCK OF DIFFERENT SHAPES ON HAND.

GAS AND WATER PIPES

AND

CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

CLAY CROSS COMPANY,

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SULPHATE OF AMMONIA.

By Her Majesty's Royal Letters Patent.

DR. FELDMANN'S APPARATUS

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES APPLY TO THE

Sole Agents and Manufacturers,

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT, BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (4 Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
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ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
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And to the following Gas Companies and Corporations—

ILKESTON.	BURY.	CHORLEY.
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HALIFAX.	MARKET HARBRO'.	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
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ST. ALBANS.	LEICESTER.	IPSWICH.
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HUDDERSFIELD.	ORMSKIRK.	LUTON.
		HAMPTON COURT.

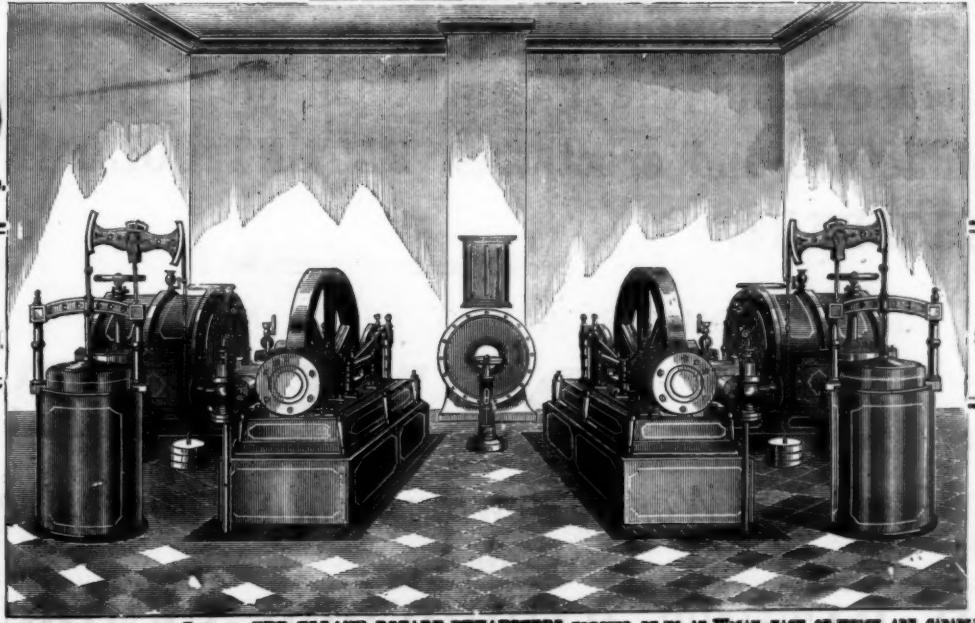
R. DEMPSTER & SONS, Ltd.,

ESTABLISHED 1855.

ROSE MOUNT GAS ENGINEERING WORKS,

ELLAND.

No. 1. Flange Valve.



No. 5. Screw Valve.

NO SLIP.

NO OSCILLATION.

NO HIGH SPEED.

STEADY GAUGE.

No. 3. Screw Valve.

No. 6. Disc Valve.

The above is an Illustration of a Pair of the ELLAND ROTARY EXHAUSTERS erected by us at Wigan, each of which are capable of passing 80,000 cubic feet of Gas per hour.

Makers of every other description of Gas Plant, including Retorts, Retort Mountings, Condensers, Washers, Tar and Liquor Separators, Scrubbers, Purifiers, Gasholders any size, Patent Centre-Valves, Four-Way Valves, Rack, Screw, and other Valves.

Testimonials and References on Application to

DEMPSTERS', ELLAND.

JOSEPH CLIFF & SONS,
INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
WORTLEY, LEEDS.

LONDON Offices & Depôts:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N.
GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.
RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

ESTABLISHED MORE THAN A QUARTER OF A CENTURY
WORKS HUNSLET, LEEDS
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CLAYTON SON & CO. LTD.
MAKE A SPECIALTY OF GASHOLDERS

AND MAKERS OF **GAS PLANT** OF EVERY DESCRIPTION.
REGd. TELEGRAPHIC ADDRESS: "GAS LEEDS"

GAS COAL. BEST REAL OLD SILKSTONE GAS COAL.
Address, THE STRAFFORD COLLIERIES COMPANY,
Near BARNSLEY, SOUTH YORKSHIRE.

IMPORTANT ANNOUNCEMENT.

Messrs. Robert and John Dempster beg to announce that they have made arrangements with Messrs. Gadd and Mason and the Patent Gasholder Syndicate to manufacture and erect their PATENT COLUMNLESS GASHOLDERS.

ALL COMMUNICATIONS TO BE MADE TO

R. & J. DEMPSTER,

Gas Plant Works, Newton Heath, Manchester,

OR TO

THE PATENT GASHOLDER SYNDICATE,

504, STOCKPORT ROAD, MANCHESTER.

RUSCOE'S PATENT MACHINE

FOR DRILLING AND TAPPING WATER-MAINS AND GAS-MAINS UNDER PRESSURE.

Patent Saddle Back and Drilling Apparatus, whereby Gas and Water Mains can have 2-in., 3-in., 4-in., 5-in., and 6-in. Branches put on without loss of Water or Gas.

Sole Maker of HELPS' PATENT PIPE EXTRACTOR.

Prices and Particulars on Application to

JOHN RUSCOE, Albion Works, Hyde, near Manchester.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S PATENTS

All Spent Limes are most effectually, economically, and continuously recovered, and at from one-third to one-half the cost of New Lime. The results are a surprise to all who have inspected the process, and are entirely satisfactory to all now using it. Descriptive Pamphlet and Terms from Agents as under.

— REGENERATIVE SETTINGS OF RETORTS. —

Hislop's Patent Producer and Patent Charging Appliances offer advantages which are unapproachable, while in every other detail his Settings are confidently recommended as being the most inexpensive and effective possible.

Illustrated Pamphlet and Terms on application to J. E. FISHER, Stourbridge, Agent for England and Wales; to C. M. HAMILTON, Portland Place, Hamilton, Agent for Scotland and Ireland; and for all other Countries to the Patentee,

Geo. R. HISLOP, Gas Engineer, PAISLEY, N.B.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE ST., BIRMINGHAM—SOLE AGENT: A. C. SCRIVENER.

TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.

LONDON DISTRICT OFFICE: 6, STRAND, LONDON—C. PARKER & SON, SOLE AGENTS.

TELEGRAPHIC ADDRESS: "PARKER LONDON."

S. CUTLER & SONS.

Offices: 16, Great George St., Westminster. Works: Millwall, London.

Apparatus of every description for Gas and Water Works.

MORRIS & CUTLER'S PATENT "PERFECT" CONDENSER.

The most efficient condensing apparatus obtainable. In use at 60 Works, and now in course of erection at Melbourne, Hornsey, Winchester, Ware, &c.

LIVESEY AND TANNER'S PATENT DIFFERENTIAL TAR AND LIQUOR OVERFLOWS FOR HYDRAULIC MAINS.

A neat and effective apparatus to remove Tar from the Hydraulic Main and ensure a light Liquor Seal.

300 Sets in successful operation.

CUTLER'S PATENT WATER-SEAL VALVES, especially suitable for large Mains at Purifiers. In use at important London and Provincial Works.

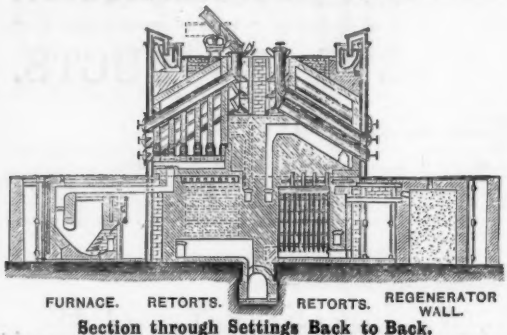
CUTLER'S PATENT FREEZING PREVENTER AND CIRCULATOR for cups of Gasholders. Now being fitted to Holders at the Works of The Gaslight and Coke Company, and at the Imperial Continental Works at Hanover and Vienna.

Further particulars of these and other useful specialities will be supplied on application to the Westminster Office.

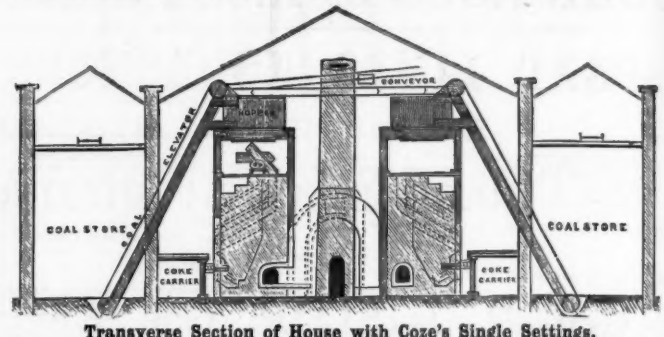
AUTOMATIC SYSTEM OF CHARGING & DRAWING INCLINED GAS-RETORTS.

Gold Medal, Paris Exhibition, 1889.

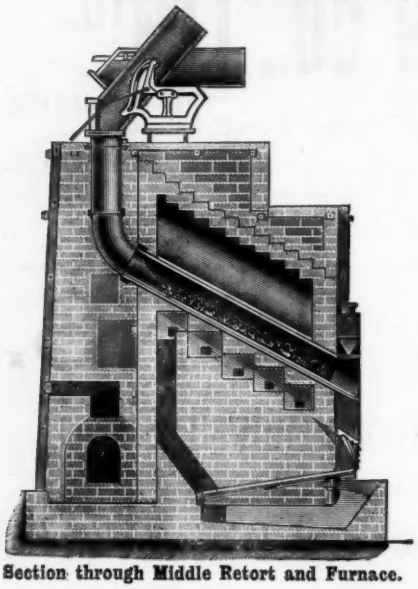
This System of Automatically Charging and Discharging Retorts without machinery or arduous labour is in operation at several places on the Continent and in America, and will shortly be at work in various Gas-Works in England.



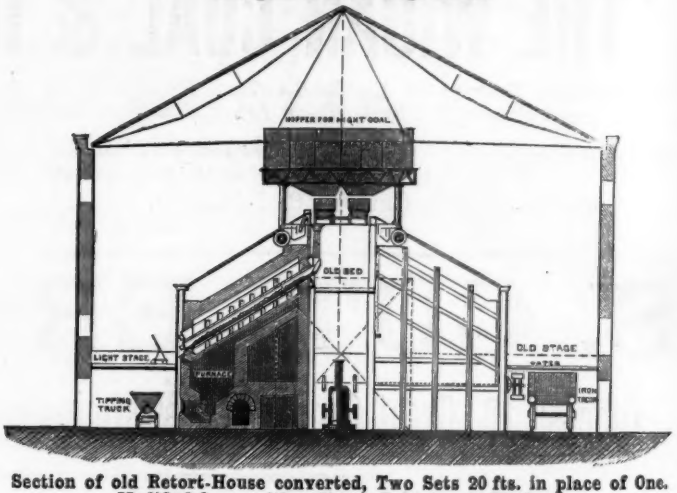
Section through Settings Back to Back. Working off ground floor with Generator under Stage and Regenerator under the Sets.



Transverse Section of House with Coze's Single Settings, Showing Method of working Two Single Settings and Distributing the Coal to the Supply Hoppers; the whole of the work being Automatic. This plan is for a large House.



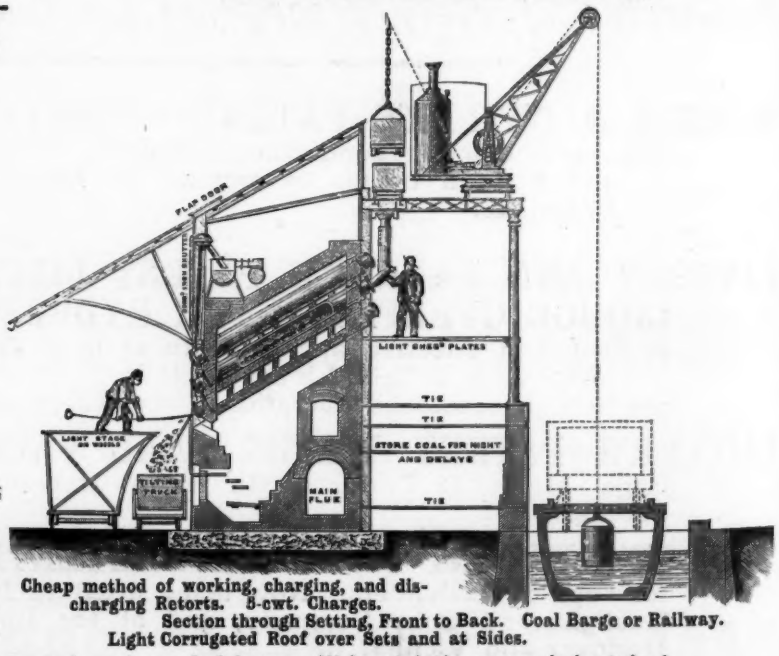
Section through Middle Retort and Furnace.



Section of old Retort-House converted, Two Sets 20 fts. in place of One. Modified form, with ordinary Retorts and Fittings.

Front View.

Section through Furnace & Bed.



Cheap method of working, charging, and discharging Retorts. 3-cwt. Charges. Section through Setting, Front to Back. Coal Barge or Railway. Light Corrugated Roof over Sets and at Sides.

These Systems are fully Patented, and any Infringer will be strictly proceeded against.

For further particulars apply to **W. M. KIGHT**, Secretary of **THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED, 86 and 88A, LEADENHALL STREET, LONDON, E.C.**

KIRKHAM, HULETT, & CHANDLER'S, LTD.,

NEW PATENT

"STANDARD" WASHER.

EXTRACTS the WHOLE of the AMMONIA

Also a Large Proportion of H_2S and CO_2 from Gas.

MINIMUM WEIGHT IN MOTION.
MINIMUM DRIVING POWER.
MINIMUM BACK PRESSURE.
MINIMUM WEAR AND TEAR.
WITH MAXIMUM RESULTS.

The following List comprises the orders received for PATENT "STANDARD" WASHERS constructed according to the Company's latest patent, and Renewals effected by the application of same to old pattern Machines.

NEW PATENT "STANDARD" WASHERS.

The Gaslight and Coke Company—	Capacity, cub. ft. per 24 hours.
Kensal Green	3,000,000
,,	3,000,000
West Ham	3,000,000
Liverpool	3,000,000
Rochdale	3,000,000
Manchester	2,500,000
Glasgow	2,500,000
,,	2,500,000
Leicester	2,250,000
Melbourne	1,500,000
Charlottenburg	1,500,000
Derby	1,500,000
,,	1,000,000
Cambridge	1,000,000
Nice	875,000
Barcelona	875,000
Magdeburg	750,000
Valparaiso	600,000
Halle	600,000
Barry and Cadoxton	500,000
Workington	500,000
Lowestoft	500,000
Erfurt	400,000
St. Chamond	350,000
Atlas Steel Works, Sheffield	250,000
Lille	250,000
Rawmarsh	200,000
Vercelli	200,000
Hitchin	150,000

RENEWALS.

The Gaslight and Coke Company—	Capacity, cub. ft. per 24 hours.
Beckton	2,500,000
,,	1,250,000
Nine Elms (in part)	3,000,000
Shoreditch ,,	2,500,000
Pimlico ,,	2,000,000
Bromley ,,	2,000,000
South Metropolitan Gas Company—	
Vauxhall (in part)	3,000,000
Birmingham ,,	5,000,000
Croydon	1,500,000
Edinburgh	1,500,000
West Ham	1,500,000
Nottingham	1,500,000
Melbourne	1,500,000
,,	1,500,000
Maidstone	1,000,000
Kingston-on-Hull	400,000
Harrow	250,000
Buxton	250,000

Testimonial from the Chief Engineer of The Gaslight & Coke Co.

The Gaslight and Coke Company, Horseferry Road, Westminster, S.W., Nov. 25, 1889.

Messrs. Kirkham, Hulett, and Chandler, Limited,

Gentlemen,—In reply to your enquiry respecting the result of putting "Wooden Bundles" into some of the Washer-Scrubbers at our Beckton Station, I beg to say they have answered admirably for the few months they have been in; and I think them a decided success.—I am, yours truly,

(Signed) G. C. Trewby.

NOTE.—The first Washer referred to in the above was fitted with improved "Bundles" in May, 1888; and these have proved so satisfactory that The Gaslight and Coke Company have had several other "Standard" Washers fitted in the same manner, and have recently given an order for machines for 6,000,000 cubic feet per day.

PALACE CHAMBERS, BRIDGE STREET,

WESTMINSTER, S.W.

R. LAIDLAW & SON.

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES.

Two Gold Medals, One Silver Medal, One Bronze Medal, and Two Honourable Mentions,

INTERNATIONAL EXHIBITION, EDINBURGH, 1886.

A LARGE STOCK OF GAS AND WATER METERS ALWAYS READY FOR IMMEDIATE DELIVERY OR SHIPMENT.

PRESSURE REGISTERS.

STATION METERS,

WITH ROUND OR SQUARE CASES.

Improved Station and Exhauster Governors.

Lamp Pillars,
WITH EITHER WET OR DRY METERS FOR AVERAGE METER SYSTEM.

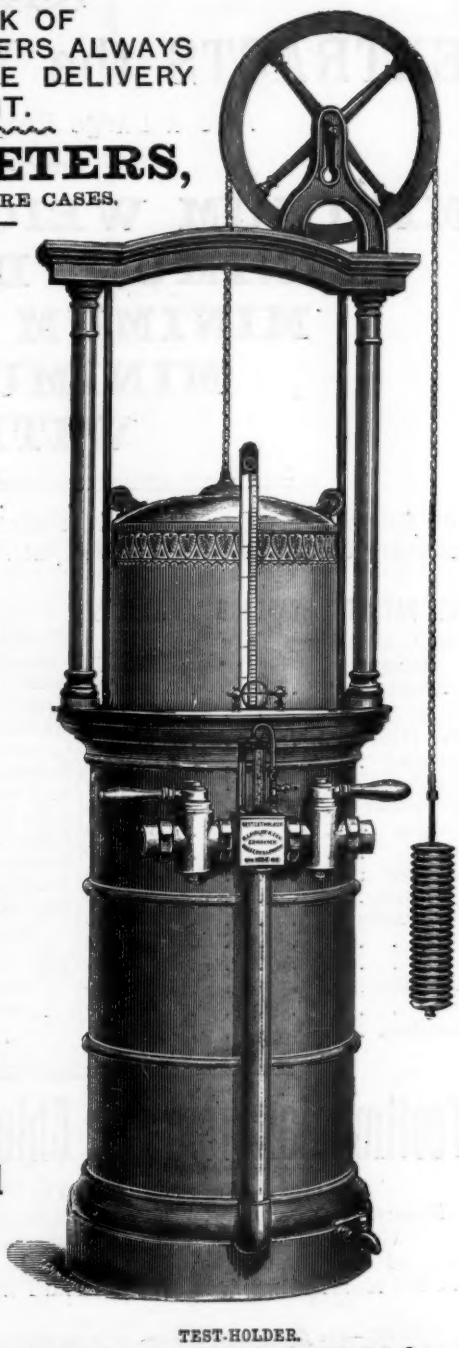
Experimental Hourly-Rate and Test Meters.

Experimental Apparatus.

Pressure Gauges.

Condenser Thermometers.

Siemens' Patent Water Meters, and Gas Apparatus and Fittings.



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STANDARD TEST-HOLDERS AND TEST-METERS FOR OFFICIAL INSPECTORS, &c.,

AUTHORIZED BY THE BOARD OF TRADE STANDARDS DEPARTMENT.

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

IMPORTANT TO
GAS ENGINEERS AND GAS MANAGERS:

The most Economical, Reliable, and Handy Tool for Forge Work for

ENGINEERS, MACHINISTS, TOOL MAKERS, FITTERS, FORGERS, STAMPERS, COACH BUILDERS,

AND FOR USE IN

GAS-WORKS, SMITHIES, IRON-WORKS, COLLIERIES, &c., &c.,

IS

THE TANGYE GAS-HAMMER

(ROBSON & PINKNEY'S PATENTS)

As supplied to several of the principal Gas-Works.

TANGYES LIMITED
SOLE MAKERS.

As supplied to several of the principal Gas-Works.

From Tangyes' Copyright Catalogue.

Hand Gear.

From Tangyes' Copyright Catalogue.

Foot Gear.

(From Photos of the ¾ cwt. size.)

THE above illustrations represent THE TANGYE GAS-HAMMER AS now made. Since its introduction it has been greatly improved both in design and simplicity of working. It has also been constructed to work either with Hand Gear or with Foot Gear.

This—the first Gas-driven Forging Hammer introduced—was designed, and at first recommended only for use in cases where steam was not available or could only be employed at great expense, but the data given below, and which are founded upon reliable and sustained test and trial, demonstrate that the **GAS-HAMMER** may be economically used in competition with the Steam-Hammer, even in places where the price of gas is at its highest.

"*Since the appearance of our* ['*The Engineer*'] *notice, the Hammer has been in some respects re-modelled, and its remarkable economy placed altogether beyond a doubt. . . . The Hammer described is that known as the ¾ cwt. size, and has a cylinder of 7 in. diameter and 6½ in. stroke. The maximum blow is very nearly that which would be given by* **a weight of 3 cwt. falling through a height of 1 ft.**; *and this can be repeated at the rate of* **110** *blows per minute. . . . Extended test in practical smith work has demonstrated that over* **2500 of the heavier blows** *referred to above, can be given with* **one pennyworth of gas** *at half-a-crown per* 1000 *feet—i.e., the Birmingham price to small consumers—or over* 4500 *varying blows for the same consumption.*"—"**The Engineer,**" **Sept. 10, 1886.**

The Gas-Hammer dispenses with Boilers, Coals, Ashes, and Dirt necessitated by Steam-Hammers.

It is ready for work at any moment, day or night, and works as economically for a few minutes' spell as when in sustained operation.

PRICE LISTS AND FULL PARTICULARS ON APPLICATION.

Tangyes Limited, CORNWALL WORKS, Birmingham,

London, Newcastle, Manchester, Glasgow, Paris, Sydney, Melbourne.

ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

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Dublin, 1865. Paris, 1867.

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PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.
Since then we have not Exhibited for Prizes.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

And at 37, BLACKFRIARS STREET, MANCHESTER.

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2nd—Are suitable for all climates, whether hot or cold.
3rd—Incur no loss of Gas by Evaporation.
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7th—May be fixed either above or below the level of the Lights.
8th—Cannot be tampered with without visibly damaging the outer case.
9th—Will last much longer than Wet Meters.
10th—Will not cost more than one-half for repair that Wet or Water Meters do.

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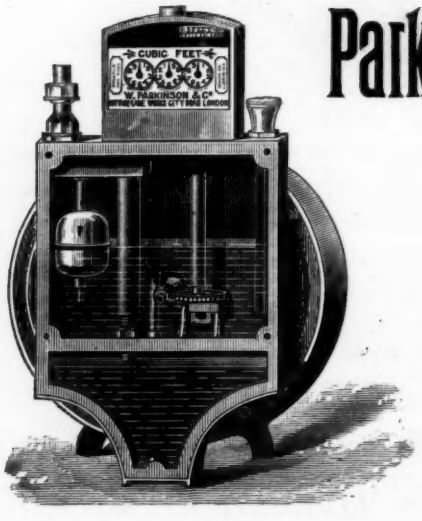

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Works with very little friction.

Will stand very high pressures.

Cannot possibly be shut off by sudden increase of pressure; the float being affected by outlet gas only.

Allows for loss of water by evaporation without materially affecting the registration or shutting off the gas.

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COMPENSATING METERS,

In Tinned or Cast-Iron Cases.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, OCTOBER 14, 1890.

The Cost of Coal and the Price of Gas.

LAST week we briefly mentioned the discussion which took place at the recent meeting of the North of England Gas Managers' Association upon the very pressing question of the connection between the cost of coal and the price of gas; but no apology is needed for returning to the subject, which is eminently a topic of the day. Before entering into the merits of this particlar discussion, however, we desire to record emphatic approval of this way of occupying the time of a district conference of gas managers. It has frequently been argued in these columns that these meetings of District Associations ought not to be permitted to become too formal and conventional, as they are apt to do if the methods and programme of large societies are slavishly imitated. The reading and discussion of set papers should, of course, be an important part of the proceedings of these Associations; but it ought not to be regarded as their sole business. Members of such societies attend the meetings as much for the privilege of having a chat with their professional brethren, in which subjects of technical and commercial interest are mentioned in a friendly manner, and opinions are interchanged without any fuss or formality, as for the pleasure of taking part in the publicly recorded Transactions. Just at the present time it is inevitable that the subject of the cost of coal and the price of gas should be uppermost in the thoughts of all gas managers who take any real interest in their work. Consequently, it is more natural that they should be invited to talk about these matters than required to concentrate their attention on (say) a mechanical or chemical paper which would, perhaps, be interesting enough in quieter times. Engineering and chemistry are, of course, always inviting the study of the gas manager; but there are periods—and we live in one just now—when the average gas manager thinks more about certain simple questions of ways and means than about any refinements of technology. Gas managers everywhere throughout the kingdom are confronted with the problem of how to sell gas at the figure to which consumers have grown accustomed, while the coal bills and pay sheets have become so alarmingly heavy that the year's working accounts are seriously altered. The only comfort that a conscientious manager can obtain from his contemplation of the existing condition of the gas industry is that the difficulties with which he has to contend are not of his own creation. It is sufficiently annoying for such a man to see all his economies and improvements of plant, wherewith he fondly imagined he should be able to reduce the price of gas and otherwise signalize his administration, swallowed up in the desperate endeavour only to maintain his ground. This experience is apt to breed in a man's mind a sort of feeling that, after all, Fatalism is the only wear, when he asks himself to what purpose has been all his thought and striving. A turn of the market, a wave of agitation passing through the ranks of labour, and all the expected fruits of economy and forethought are blighted in a moment! Nay, the most public-spirited of gas managers cannot but feel that a "tight" era in the gas industry, such as that which we are now experiencing, is likely to affect him personally in a very undesirable fashion. This is not a matter that gas managers can easily speak of, even under the protection of a mutual Association; and therefore we will state the case for them. Many a hardworking officer's prospect of advanced pay will disappear in smoke unless the threatened disturbance of the balance of the revenue account proves to be temporary. It is naturally used as an argument for increase of pay when the manager has procured an access of profit for his employers. Sometimes the additional profit may be purely accidental, and due to a turn of a market. Even then, however, the manager must be on the alert so as to take advantage of it; and, in any case, his employers rarely give him too much credit for his share in their good fortune. Now that the market for coal and labour has so turned against the gas industry that the two ends will hardly meet in any undertaking, there is no little danger that the poor manager and all the salaried staff will be made the victims of a state of things for which they are in no sense responsible. Something was said about this aspect of the subject at the recent meeting of the Commercial Gas Company; and we now repeat it at large. Directors of gas companies and members of gas committees of corporations ought in fairness to see that their faithful officers who do not form "rings" like the coal people, or combine like the stokers, are not sacrificed on that account. Gas managers and their assistants in the manufacturing department will, in fact, be compelled to work harder and bear more anxiety than ever, now that gas making at current prices is not all plain sailing and this fact should be remembered in their

favour when the calls for economy in administration induce those cheeseparing attempts upon the salaries list which may be only too confidently expected if bad times are really upon us.

It is permitted to an observer to hope, however, that the pinch in the coal market, from which the British gas industry is suffering at present, will not last. Ring or no ring, there has not been any sufficient reason shown for a permanent advance in the value of gas coal to anything like the rates of increase mentioned by Mr. T. Bower at the North of England meeting. There is no serious expansion of the gas coal trade; and it may be confidently expected that exports to the Continent of Europe will fall off, as a consequence of the advanced prices, as soon as the old contracts run out. German and French gas companies have been learning for years to do with less English coal, and to rely upon native supplies; and this perfectly praiseworthy movement will receive a sharp impetus from the recent market changes. Moreover, those gas companies and gas-supplying corporations at home that have increased their prices for gas, are certain to experience a check in their development which will set free a good deal of coal. Thus the prospect is somewhat lightened for those gas undertakings that can afford to ride out the squall without making any change in their business arrangements. The effect of the "long contract" system for coal supplies to gas-works was mentioned in the North Shields discussion. We have often exposed and denounced this system for its consequences to gas companies so ill-advised as to follow it; and it is instructive to hear it alleged as a cause of the disturbance of the coal market. It is certain that the few gas companies who have cleverly managed, as they will consider it, to secure contracts for present supplies at prices current two years ago, will plume themselves on the fact. When these contracts run out, however, the coal-owners will be more simple than we take them to be if they do not make the renewals in their own favour, or else refuse to contract for any length of time in advance. They will never take the latter course, except as a last alternative; because they very well know who profits most in the end by the long contract system. The necessary data might be obtained by a curious statistician for a comparative study of the prices paid for coal by any number of gas companies who purchase under the system of long contracts, as contrasted with an equal number of companies who buy by the year. It would be found that the former pay considerably more for their coal than the latter.

As we remarked last week, consumers of gas in the North of England are to be congratulated on the broad and liberal views expounded by the gas managers assembled at North Shields. Upon these men, in a more direct manner than on any mere directors or committeemen, will come the burden of making gas to sell at the same price as was charged before they had to allow half as much again for coal, and nearly as considerable an increase for labour. They are, notwithstanding, of one mind in holding that anything will be preferable to raising the price of gas, and thereby giving a handle to the rivals and enemies of the industry with which they are identified. It is the very sharpness of the present pinch that persuades these gas managers—living, as many of them do, actually upon a coal-field—that the present extravagant demands of the coal-owners cannot be maintained. If it were likely that gas coal would stand for long at the rates paid during the current year, it would be impossible to keep out the competition of fresh capital and fresh enterprise from the established markets. Every shilling per ton which coal commands above a certain minimum, makes an opening for other supplies. If a number of the best situated pits can afford to put coal into the market at (say) 6s. per ton, when the price rises to 9s. or 11s. there is sufficient margin for the profitable working of others. The coal famine of 1874 brought such a rush of capital and labour into coal mining, that the latter state of the market was worse than the first. That the same process is not repeated now is due to the widespread belief that the high prices cannot last. The coal-owners who happened to be favourably situated have made a fine thing of it this year. But matters will find their level in time; and all the sooner if gas companies do not complicate the conditions by following counsels born of panic, and carried out in short-sighted distrust of the future.

The Quality of London Gas in the Past Quarter.

The last quarterly report of the Chief Gas Examiner for the Metropolis (Dr. A. Williamson, F.R.S.), which will be found in another column, calls for more than the customary notice, mainly on account of the deficiencies in illuminating power and purity recorded against the Companies. It will be noticed that the average illuminating power of London gas for the whole quarter at all the testing-stations was well above the statutory limit; but it is hardly necessary to remind our readers that it is not by average excellence, but by exceptional declensions from the standard, that the Metropolitan Gas Companies are judged. All three Companies are in the same boat with regard to their difficulties with the official photometers. The Gaslight and Coke Company were under the mark on six occasions, the South Metropolitan Company four times, and the Commercial Company twice. The analyzer of statistics will not be able to make much of the dates. In the case of The Gaslight and Coke Company, there appear to have been two instances of deficiency on the same date—Sept. 12. But these were observed at such widely different quarters of the town as Lambeth and Bromley; so that there cannot have been any real connection between the two results. The other dates do not throw any light at all upon the matter. The Commercial Company, in addition, seem to have got into trouble once for showing sulphuretted hydrogen; but as they have lodged an appeal against the return, it is not discussable. The average proportion of sulphur in the whole gas supply was considerably under the permitted quantity at all the stations; but here again there were exceptional transgressions. Altogether, the quarter's returns go to show that Dr. Williamson's office is not by any means the sinecure that it once suited the eager spirits of the defunct Metropolitan Board of Works to represent it to be. Always impartial and judicious in the discharge of functions which are more automatic than he would perhaps prefer if he had the opportunity of laying them out for himself, Dr. Williamson would probably be the first to admit that the conditions of gas examination, under which Gas Companies that mean so well are returned occasionally as offenders, are anything but reliable or satisfactory to those who have to deal with the results. It is necessary to take cognizance of the *maxima* recorded at the testing-stations (which are not given in the table) in order to appreciate the value of the *minima*, which unfortunately constitute statutory offences on the part of the Companies.

Strike of Melbourne Gas Workers.

In another column will be found an interesting account of the strike of the Melbourne gas stokers, which grew out of the recent general revolt of labour in that city. It appears that there was no quarrel between the Gas Company and their workmen, but the latter were called out by the General Strike Committee because the Company were taking in coal that had been discharged from the ship by non-Union labour. The incident is therefore a lesson of what is meant by the Federation of Labour where it is in practice. The strike began at first in the shipping trade; and it would have been bad enough if it had been confined to the stevedores and wharf labourers who started it, for sooner or later the Gas Company would have had to face a stoppage of supplies. As it happened, however, all the stokers turned out at 24 hours' notice, while there was still a month's stock of coal in the gas-works yards. The efforts of the Directors and their Managers and officials to obtain fresh hands were hindered by the strikers and the populace, although how the result of the general strike could be influenced by incidentally plunging the city in darkness is a question that defies answering. The Directors stuck to their guns in face of great discouragement; never ceasing their efforts to fill the works with free labour, and keep up the supply of gas. No great amount of damage was done by the strikers and their sympathizers, although for several days the forces of law and order seem to have been wholly insufficient to assure the safety of life and property in the neighbourhood of the gas-works. The city was for a short time in darkness; but in the end the mob appear to have tired of besetting the works, and the free labour had a chance to show what could be done in the way of gas making by willing, though untrained, hands. The strikers then, discovering their mistake, tried the old policy of offering to return to work if the strangers were dismissed; but the Directors followed a good example,

and refused to desert the men who had come to their assistance in the hour of need. Eventually (according to latest information), the Company gained a complete victory so far as the immediate work of gas making was involved; but the question of coal supply, being connected with the general subject of the trade of the port, remained in abeyance. It was an extremely arduous time for the Directors and the loyal officers and servants of the Company; the withdrawal of the ordinary working staff having been most sudden, complete, and unjustifiable. The ultimate triumph of the powers of reason and order in this case is therefore something to be thankful for; and we heartily congratulate the Melbourne Gas Directors and their faithful agents on their well-earned success.

Labour Does not Keep its Word.

UNDER the significant heading, "Labour should Keep "its Word," the *American Manufacturer* narrates a simple tale of Union bad faith as displayed in the Connellsville coke region. Last February the Union coke hands in this district, through their duly accredited representatives, entered into an agreement with their employers, fixing rates of wages and conditions of working for one year. The question of the concurrent employment of non-Union labour had been mooted in the district previous to this settlement; and, to prevent further disputes on this score, a clause was inserted in the agreement stating that "it is "distinctly understood and agreed that the management "are to have the right to employ any person or persons "they desire to employ, and no others." This stipulation was observed without cavil for six months; but in August the local Committee of the workmen at one large establishment waited on the Superintendent, and demanded the discharge of all non-Union men employed on the works within six days, under penalty of a strike. The demand was, of course, rejected; and in due time the men left their employment and the works were perforce shut down. The owners thereupon entered suit for $100,000 damages against their ex-employees and the officials of the local branch of the Knights of Labour—the Union responsible for this breach of agreement. It will be interesting to see what the Courts will make of this matter; but it will be even more interesting to watch the development of the New Unionism under a condition of existence in which the leaders are legally responsible for their counsels and official actions. We hold the opinion at present that these officials are mere Tappertits, who are powerless to rule for any good the anarchical forces which they affect to lead. If they have to pay in money and person for the damage they do to trade, there will certainly be less competition for such positions.

The New Water Engineer for Bradford.—The Water Committee of the Bradford Corporation have definitely decided to recommend the Town Council, at their meeting to-day, to advertise for applicants for the post of Water Engineer, at a salary of £1000 per annum.

The Perret Dust-Fuel Furnace.—We have received from Messrs. Bryan Donkin and Co., Limited, a small pamphlet describing the above-named furnace, which has been specially designed for utilizing the smallest description of fuel. These furnaces are already in use in a number of gas-works; and those of our readers who may not be fully acquainted with their capabilities will find them set out in this little book, in which the application of the furnace to various forms of boilers is shown by a series of coloured lithographs.

Cape Town and District Gaslight and Coke [Company, Limited.—By an advertisement which appears in another part of the JOURNAL, it will be seen that the Gas, Water, and General Investment Trust, Limited, have been authorized to receive subscriptions for 1000 six per cent. first mortgage debentures of £50 each in the above undertaking, and also a portion of the share capital. The Company has been formed, with a total share and debenture capital of £150,000, to purchase and amalgamate the Cape Town and South African Gas Companies. The former Company has been in existence for 46 years, and consequently has a well-established business which has always yielded good profits; the works of the latter Company have just been completed, and will supply residential suburbs of Cape Town. Of the 10,000 ordinary £10 shares, 2000 have been subscribed for locally; and 1233 will be allotted to the vendors in part payment of the purchase-money—leaving 6767 shares for disposal. The price to be paid for the two undertakings (which have been reported upon by Messrs. Stevenson and Burstal, MM. Inst. C.E., and by Mr. Alfred Lass, F.C.A.) is £125,000, which will leave £25,000 for working capital and extensions. The subscription list will close on or before Friday next.

WATER AND SANITARY AFFAIRS.

THE annual report of the Local Government Board, published last week, contains in the appendix the usual official reports on the Metropolitan Water Supply. The subject is also adverted to in the report itself, signed by Mr. Ritchie, the President. It is remarked that, "as to "the quality of the water, Professor Frankland reports "very favourably." The excellence of the supply furnished by the Kent Company is mentioned, coupled with strictures as to its hardness. It is further observed that the water from the Thames and the Lea, though not so hard as that from the chalk wells, is by no means soft; and advantage is taken of a statement in Mr. Acworth's "Railways of England," to show the disadvantage connected with the use of hard water in steam-boilers. The softening process employed by the Colne Valley Company is approved; but it is admitted that there are "consider-"able difficulties" in the way of any such plan being adopted in respect to the large supply required for the Metropolis. "For the present, at any rate," says the report, "we must be content with the knowledge that, "for potable purposes, the goodness of the water supplied "to London satisfactorily bears such tests as chemical "analysis can supply." Among the allusions to the annual report of Major-General A. de Courcy Scott, it is stated that in the month of September, when the flow of the Thames was at its minimum, about 19 per cent. of the average daily discharge of the stream was withdrawn for distribution. In the case of the Lea, it is alleged that when the flow is at its minimum, "practically the entire "body of water is required for the districts of the New "River and East London Companies." This is a point on which General Scott is accustomed to dwell at some length; and on the present occasion he discusses the subject very fully—bringing forward a variety of data. Happily, he decides, with regard to the Thames, that "the withdrawal of the quantity taken by "the Companies can have no appreciable effect on the "*régime* of the river in a general sense." It is otherwise with the Lea, where in the months of June, July, August, and September, in dry years, the daily volume of discharge, including the Companies' supplies, does not exceed 45½ million gallons. On the other hand, the daily supply required has already reached, in the summer, a total of 81 million gallons. To make up the difference, there are wells, and 10 million gallons daily which the East London Company can draw from the Thames at Sunbury. It seems to us that if the Lea is to fail—an event only likely to occur in particular seasons—it is quite practicable, so far as physical forces are concerned, to meet the demand by drawing more largely on the Thames, seeing that a good margin still remains in that quarter. The increase of population is greatest in the East London district, where the consumers are annually augmented by about 34,000. Including all the Companies, the yearly increase is about 130,000. General Scott argues that not only is the supply more heavily drawn upon as the population increases, but there is a greater risk of pollution. To this it may be replied that recent years show an improvement in the quality of the water. How far this is due to better filtration may be a matter of debate; but if the supply is good, there is little reason to quarrel with the source. It is also to be hoped that as the population increases, measures will be taken, *pro ratâ*, to exclude all sewage contamination from the streams and underground waters. A remarkable fact is shown by General Scott—that the increment of population served by the Water Companies last year exceeded the increment of 1888 by 2561 persons. This, we are told, "is the first year since "1884 in which there has been a break in the progressive "decrease of the annual increments of population sup-"plied." Other features of General Scott's report we may perhaps refer to on a future occasion. The report by Mr. Allen Stoneham, the Government Auditor, shows that the net water-rental of the Companies last year underwent an increase of £36,722. In no case was there a decrease; but the largest increment was gained by the New River Company—the amount in that instance being £11,548. Dr. Frankland's report we noticed at the time it appeared in the Annual Summary of the Registrar-General, as far back as April last.

Some facts of more than usual importance were adverted to by Mr. A. W. Gadesden, the Chairman of the

East London Water Company, at the half-yearly meeting of the proprietors last week. The action of Parliament in allowing the Midland Railway Company to carry a line through the impounding reservoirs of the Water Company, involves a singular reflection on the professed anxiety of the Legislature for an efficient supply of water to be provided for the Metropolis. The decision was aggravated by the circumstance that the East London Company had to bear the burden of their own costs for acting in defence of the public health. Another feature in Mr. Gadesden's speech consisted in the account given of the resources of the supply. It is calculated that the Company can command, sooner or later, a volume of water equal to 62 million gallons daily; while at present the average demand is only about 41 million gallons. But the Chairman was particularly impressed with the ardour displayed by the London County Council, in pursuit of the idea that the water supply should belong to that body. Mr. Gadesden anticipated that much would be said as to the inability of the Companies to meet the future demand for an increased supply of water. On this account he cited the figures we have already quoted. Our readers may be interested in comparing the statistics of Mr. Gadesden with those of General Scott, to which we have drawn attention in another paragraph. It is there stated that in summer, the maximum daily demand on the New River and East London Companies combined amounts to 81 million gallons. Of this, the latter Company had to furnish about 44 million gallons, as a daily average, in July last year. Accordingly, if that Company can reckon on resources equal to 62 million gallons daily, there is nothing to fear for a good many years to come, as to the adequacy of the supply to meet the maximum demand, although the population in the East London district is increasing with peculiar rapidity. If the enormous and wilful waste of water in that district could be more effectually checked, the prospect of an adequate supply would be still brighter. Respecting the transfer of the Metropolitan Water-Works to the London County Council, Mr. Gadesden dwelt with much force on the largeness of the area of supply outside the Metropolitan boundary, and asked whether it was likely the important outlying populations would submit to be governed by the County Council of London in the matter of their water supply. This is a point possessing considerably more practical importance than Mr. James Beal and his friends seem to suppose.

A coroner's jury at Poplar has returned a verdict that a child twelve weeks old, the son of Dr. Samuel Eakin, has "died from choleraic diarrhœa consequent on the cutting "off of the water supply." It may be worth while to notice that the child was not taken ill until the day after the water was put on again; the supply being cut off from the Monday until the Saturday. The child was taken ill on the ensuing Sunday, and died after an illness of two days. An assistant to Dr Eakin gave evidence that the party walls between the house where the Doctor lived and the one adjoining were "knocked away." This adjoining house was also occupied by Dr. Eakin; and his assistant stated that there was a plentiful supply of water there "all the time." Whether Dr. Eakin helped himself from that source, does not appear; and it is stated that in the house where the supply was cut off, the drains were rendered very offensive. Of course, such a state of things was likely to induce choleraic diarrhœa in an infant; and a medical witness deposed that "in all probability the illness was set up by "the water being cut off." The inference is natural enough, and is endorsed by the verdict of the jury. Taking this view of the case, the death of the child is particularly lamentable; and the strangest part of the affair consists in the conduct of Dr. Eakin, who, by his unfortunate and ill-judged refusal to pay the water-rate, caused the supply to be cut off—thereby placing the house in an insanitary condition. He had every opportunity given him to prevent such a result; frequent applications being made for payment of the rate, and the law being fully explained to him. The water-rate was due for the entire year ending at Midsummer last; and it was certainly time to get the affair settled by the latter end of September. Some time back the landlord paid the rate; the assessment at that time not exceeding £20. Subsequently, the assessment was raised to £22, whereby the occupier became liable for the rate. Dr. Eakin was clearly informed on this point, but refused to pay, simply because he had not paid in former years, when the assessment was low enough to throw the liability on the landlord. On this shadowy pretext, Dr. Eakin was prepared to "fight the "Company," although, as a medical man, he must have known the peril to health which his procedure was only too likely to involve. So infatuated did the conduct of Dr. Eakin appear to the Coroner, that this functionary said he "felt bound to suggest that the stub-"bornness of Dr. Eakin had caused the death of his child." The Doctor wanted to be summoned over the question of the rate; as if ambitious of the distinction to be derived from appearing in Court as the opponent of a Water Company. It would seem as if he sought to emulate the fame of Mr. Archibald Dobbs; but, if the verdict is to be relied upon, Dr. Eakin has made a melancholy mistake, and has unwittingly sacrificed his child to a crotchet which could benefit nobody.

American Gaslight Association.—We learn from the latest circular issued by the Secretary of the above-named Association (Mr. C. J. R. Humphreys) in reference to the forthcoming annual meeting, that four papers, in addition to those mentioned in the paragraph in the JOURNAL for the 23rd ult., have been promised. They are as follows: "Inclined Retorts," by Mr. F. Egner, of St. Louis; "Gas Purification," by Mr. A. E. Forstall, of Chicago; "Methods and Systems for Recording the Histories and Accounts of Gas Companies," by Mr. W. P. Fodell, of Philadelphia; and "The Gas Engineer and his Pencil," by Mr. F. H. Shelton, of the same city. The meeting, it may be remembered, will be opened to-morrow in Savannah, under the presidency of Mr. Emerson M'Millin.

Large Sulphate of Ammonia Plant for the South Metropolitan Gas Company.—One of the most important contracts for sulphate plant given out in this country was placed last week by the South Metropolitan Gas Company, with Mr. Henry Simon, C.E., of Manchester, for the erection complete of sulphate of ammonia plant capable of dealing with any quantity up to 30,000 gallons of ammoniacal liquor per diem. The plant consists of two large ammonia stills on Simon's system, working in connection with Wilton's saturators and sulphate dischargers. The Simon stills are growing in favour in London; two of them, of smaller capacities, having been in operation at the Tottenham and the Kingston-upon-Thames Gas-Works for some time, with, we believe, entire satisfaction.

Close of the Water Supply Inquiry of the Corporation of London.—The inquiry instituted by the Corporation of London into the water supply of the Metropolis was resumed yesterday morning at the Guildhall, under the presidency of Sir Guyer Hunter, K.C.M.G. In the course of the proceedings, the Chairman stated, in reference to the financial part of the subject, that he had consulted Mr. W. C. Watson, a banker and financier, who had expressed the opinion, based on an experience extending over a quarter of a century, that £30,000,000 could easily be raised on a water security at 3 per cent. interest. Mr. Rose-Innes then put in a number of Acts of Parliament authorizing the transfer of water undertakings to public bodies; and the inquiry closed as far as the taking of evidence was concerned. Sir Guyer Hunter, in adjourning the proceedings to enable the Committee to consider their report, remarked that they had gone as far as they possibly could into the matter submitted to them; and he hoped that the decision to which they would come would be considered impartial and just to all concerned.

The Supply of Natural Gas in America.—According to the *American Manufacturer*, complaints are being made, in nearly every locality where natural gas is used as a fuel, of advances in price by the supplying companies; and it appears that in many cases the increase is met with open opposition, which receives the support of the press. Rival companies, who will undertake to furnish gas at or below the old rates, are rashly promised; the difficulties attending their establishment being of secondary consideration as compared with the great work of fighting the "gas monopolies." It is pointed out, by the above-named publication, that the visible supply of natural gas is slowly declining within the limits of the fields from which it was first readily and cheaply drawn; and that the acquisition of other sources, outside existing developments, will involve the expenditure of large sums of money, which must in turn entail upon the consumer greater expense for the quantity of gas burnt. If extensions have to be made, it is argued that the old companies are in a position to do it as cheaply as new concerns. At present natural gas is used very wastefully under the system of supply by contract; and an advance in price for the purpose of checking this, and enforcing economy of consumption, is scarcely to be condemned, under the circumstances. At the same time, anything like extortion should be avoided. Our contemporary thinks that a more sparing use of the fuel is being forced upon the public; and this, it is believed, must ultimately be brought about, either through the adoption of the meter system of selling, or by the use of improved appliances for the ordinary purposes of heating.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 814.)

THE past week has been one of great depression in the Stock Exchange. Almost every market has suffered more or less; and the settlement just concluded has been a disastrous one to many a speculator. The pernicious and reckless spirit of gambling in stocks which has long been rampant, suggests really very serious considerations. The Money Market has not altered; and there is reason to hope that the present rate may stand for some little time. The Gas Market has been fairly active; and stocks in general may be noted as firm and steady. Several issues are quoted higher; but, on the whole, the prices actually obtained are much about the same as they were the week before. Gaslight "A" has been subject to some fluctuation. Opening at 235½, it fell away to 233 on Thursday; and the lowered quotation showed a fall of 1. On Saturday, however, it was put up 1½; but transactions marked showed a wide margin—ranging from 232½ to 236. Of the secured issues, the debenture stock went rather cheap, and the "B" 4 per cent. maximum rather dear—that is, to pay something less than 4 per cent. for money. Why anyone should pay such a price for it, when he can buy in cheaper terms preference stocks of the same Company which must receive their dividends in full before "B" can touch one sixpence, is one of the mysteries. Very little was done in South Metropolitans; but there is still a disposition to buy "A," and all the issues maintain good prices. Commercials have hardly been touched. The stocks are now quoted *ex div.* at figures which make the new stock 3 better. Here is another mystery. One can buy the old stock at a price to pay nearly ½ per cent. for money more than the new stock. Now if we were living in such rosy times for the gas industry that there was a prospect of the Company reducing the price, and increasing their dividend, this difference in value might to a certain extent be justifiable. But as things are, the position is just the reverse. Among the Suburban and Provincial undertakings, Alliance and Dublin is conspicuous with an *ex div.* quotation as high as the *cum div.* Of the Foreign companies, the Continental group are fairly steady, though Ottoman is ¼ lower. The rest present no particular feature, except San Paulo, which has made a considerable advance. The Water Companies are extremely quiet, and very steady—unaffected by the prospect of renewed negotiation for their acquisition by the State.

The daily operations were: The Gas Market opened firm on Monday. Business was only moderate. Prices kept up well generally; and South Metropolitan "A" rose 2. East London Water rose 2. On Tuesday, Gaslight "A" was more dealt in, and at rather easier prices. Wednesday was quieter; and Gaslight "A" was still disposed to droop. San Paulo improved ½. Transactions were much restricted on Thursday; and prices generally were not at their best. Gaslight "A" receded 1. On Friday, business was mostly in Gaslight "A" and Imperial Continental. The tendency was upward; and several *ex div.* variations were for the better. Nothing was touched on Saturday, except Gaslight "A," the quotation of which was advanced 1⅛.

ELECTRIC LIGHTING MEMORANDA.

A "Times" Article on a Fresh Electricians' Grievance—The Attitude of Local Authorities owning Gas-Works to Electric Lighting—Opposition to the Incurring of Debts by Local Authorities for Electric Lighting Purposes—Electric Light "Sunstroke."

A LONG article appeared in last Tuesday's *Times* on the subject of the "Middleman in Electric Lighting." At first sight this would not strike one as a very thrilling topic; but the writer endeavours to arrest the attention of his readers at the outset by asking whether the framers of the Electric Lighting Acts, 1882 and 1888, contemplated the creation of "a body of middlemen" between the Board of Trade and the actual suppliers of electricity—the object being apparently to prejudice any possible reply to such a question by the use of a word which has a distinctly bad odour. It soon transpires that the writer had in view the much-debated proposal to allow public authorities possessed of Electric Lighting Orders to contract with trading bodies for carrying them out under additional conditions imposed by themselves. This system has actually been sanctioned in certain cases; and *The Times* correspondent perceives in it a fresh obstacle to the development of the electric lighting industry. The Board of Trade have inserted in a few Electric Lighting Orders granted to local authorities the desired permission to delegate to contractors the statutory powers conferred by these Orders; and the electrical interest are trying to make another grievance out of the proceeding. They pretend that by this system the local authority is converted into the middleman between the actual suppliers of electricity and the Board of Trade. What this term means in this case it requires no less than a column and a half of *The Times* to explain. It is argued that when a local authority are possessed of these powers of carrying out an Electric Lighting Order by proxy, they can impose their own conditions on the contractors; insisting, for instance, upon shortening the time allotted under the statutes before the compulsory purchase of the undertaking could be carried into effect. This condition would make a contractor establish a sinking fund for the redemption of his capital; and "the larger the sinking fund, the higher must the charge be for electricity, the more disadvantageously must electric light compete with its cheaper rival gas, and the more restricted in consequence must be the area of possible supply." This is a dreadful picture; but how is it that it does not occur to the complainant that the remedy lies, after all, in the hands of the electrical contractors, who, by refusing to accept delegated powers of lighting weighted with unfair terms, may easily bring grasping local authorities to their senses?

Another point in the aforesaid article calls for notice. The writer argues generally against the placing in the hands of any local authority the "power to practically annul the provisions of an Act of Parliament, and to arrest the progress of electrical enterprise." His protest becomes intensely bitter, however, when he thinks that a large number of these local authorities are owners of gas undertakings. What is the natural consequence that the writer sees? What but a deliberate desire on the part of these local authorities interested in gas to crush electric lighting? "To shut out all other applicants, they, too, will obtain Provisional Orders. They can hardly be expected to cut their own throats by working them themselves; will they do so indirectly by the concession of favourable terms to lessees? . . . The result has been to render the Act a dead letter in the case of all towns so governed." It seems a pity to deprive electricians of the comfort of feeling that the gas interest is so afraid of them that it will resort to any tyranny to extinguish their prospects; but it is necessary to state the facts, It is therefore with some slight regret at having to knock down an elaborate rhetorical structure with one or two brutal facts, that we venture to remind the writer and readers of *The Times* article that the local authorities who have actually done most in practical electric lighting are owners of gas undertakings; as, for example, Leeds, Bradford, Blackpool, and Greenock. When *The Times* correspondent has dealt with these instances, which contradict his theory, it will be soon enough to regard the rest of his contentions seriously.

A vigorous opposition has been started in Brighton to the carrying out of the Electric Lighting Order which the Corporation have managed to obtain, in direct opposition to the tenor of the evidence at the local inquiry. It remains to be seen whether the Corporation will be sufficiently hardy to take any further steps in the matter, after what has transpired in connection with the Bradford undertaking. The ratepayers of the parish of St. Pancras also are likely to be shaken in the confidence with which they seem to have hitherto regarded the parochial electric lighting venture by the statement recently made by a vestryman that their local public debt already amounts to £250,000, or more than £1 per head of the whole population, not one penny of which is represented by anything that can be called a reproductive investment. To increase this indebtedness by a heavy amount for an electric lighting plant, which, if it is going to pay for itself, will differ greatly from all other similar undertakings in the kingdom, is a proceeding that can hardly be described as prudent in the circumstances.

The proverbial joy of the medical profession over a new disease or ailment has been gratified by the discovery of a variety of sunstroke effect produced in the human subject by prolonged exposure to the intense light of the electric arc. It has been suggested that the injurious effects of electric lights upon the eyes are due to their containing a preponderance of actinic rays belonging to the violet end of the spectrum; but a German medical authority who has investigated the subject thinks differently. He ascribes the mischief to the fact that the luminous waves proceeding from a powerful electric lamp are of very great intensity. Even the adoption of hygienic eye-shades does not completely cure the evil. There is no remedy but resting the eyes, and the application of cold water compresses. Sometimes more active treatment has to be pursued under medical advice, in order to preserve the eyesight. It has been stated that ticket inspectors engaged at railway stations lighted by arc lamps are peculiarly liable to these evil effects, which can be partially avoided by providing a good gas-light at the place where the tickets are collected. So far as we are aware, however, exact statistics relating to this matter have never been published.

The Prevention of Boiler Incrustation.—According to *Industries*, M. Vignon, after examining various commercial materials sold for the purpose of preventing the incrustation of boilers, believes that many of them consist of an extract of tannin and carbonate of soda in aqueous solution. Sumach is the tanning material usually employed. He points out that tannin is used in order to mask the formation of any incrustation, as it combines with the iron of the boiler, forming a dark deposit which completely masks the precipitate of carbonate of lime which is at the same time thrown down. As tannin is an oxygen carrier, it seemed probable that its use would be prejudicial to the life of the boiler; and the author, after conducting a series of experiments to elucidate these points, has summarized his results as follows: That free tannin (extract of bark, &c.) attacks the sides of the boiler; that, when it is associated with carbonate of soda in excess, it acts in the same way; and that carbonate of soda has no appreciable influence. He therefore condemns the use of all anti-incrustators which contain tannin.

PROFESSOR ALFRED MARSHALL ON THE ECONOMICS OF GAS SUPPLY.

Out of much talk that arose at Leeds in and about the British Association meeting, there was one utterance at least that struck the attentive ear as instinct with truth and wisdom. This was the address of Professor Alfred Marshall, President of the section devoted to Economic Science, upon "Some Aspects of Competition." Professor Marshall's peroration has already been quoted in the Journal (see first editorial on the 9th ult.); and it has been reproduced in newspapers and periodicals of every shade of opinion, political and economic, purely because the weighty words express so clearly one of the special anxieties of the times. In selecting his subject for the Leeds meeting, Professor Marshall displayed in a high degree that power of comprehending the drift of contemporary thought which is not so frequently observed in academic authorities as could be desired. There is nothing that makes worldly people so impatient of college professors as the thought that, while they are daily and hourly engaged in working out economic problems in such a practical way that their own livelihood depends upon the result, the accepted expounders of economic theory seem to be withdrawn from actualities, and to live in a world of abstractions. Otherwise it is a remarkable thing that, while the affairs of the working world are so engrossing for people who have a living to get, that many of them can hardly think or talk of anything else, the generalizations upon this same experience which constitute what is called Economic Science are commonly voted by business people dry and uninteresting. This is much to be regretted. It would be eminently desirable if all sciences could be studied and taught by men of experience in the practice of the arts and industries out of which they have arisen, and also that working people should be primed with the systematized deductions from recorded experience which, when assembled in a proper manner, are called Science. If this could be managed, doubtless many mistakes and much waste would be prevented. Academicians would be retained in salutary fashion to the common earth, and practical persons would be spared the toil and sorrow of verifying recognized truisms. The professors would be able to point out the direction in which new efforts might be reasonably expected to be fruitful in useful discoveries; and the working world would continually bring before the professors fresh experiences to systematize and judge on general principles. In this way the world would be spared much misdirected effort and no little purposeless theorizing.

It so happens, however, that there is no ultimate Court of Appeal in these matters. People with their living to get will take their own way, and either disregard scientific leading altogether, or seize upon certain half-understood principles, and push them to ridiculous extremes. Thus, for example, in this country and in the United States the principles of the science of Political Economy as originally promulgated have got into partial acceptance; but notwithstanding this, a good deal of correction is commonly applied to such principles as disagree with what are recognized as stronger laws. It was a triumph of the founders of the science of Political Economy to discover something like law and order in the commercial and social relationships of men and communities that had previously been played with by autocratic authorities. When they demonstrated the nature of the laws that had really governed the economic development of communities, irrespective of the desires and enactments of temporary rulers, they threw a broad light over much that had previously lain in impenetrable darkness; but when they went on to teach that men were mere puppets for exhibiting the operation of unpitying, unyielding, if passionless laws, the conscience of humanity revolted against the conclusion. Men who readily conceded the general truth of economic laws could not refrain from breaking them in the real or supposed interests of humanity, patriotism, or some similarly over-mastering idea. It was originally predicted that the promulgation of sound economic principles would be followed by their universal acceptance, and that the immediate consequence would be the Millenium. We have had the promulgation, in all languages; but the other results have not been forthcoming.

There has consequently been a re-investigation of the data of Economic Science by those who have not been able to concede that original sin or stupidity on the part of foreigners is sufficient reason why Free Trade has not flourished greatly outside these islands, and why certain other immortal principles have not met with universal acceptance. There is the question of competition, for example. We say, in a general way, that competition is the soul of trade; and yet many people, and the readers of the Journal in particular, understand vaguely that unless competition is limited in some industries—notably in that of gas supply—it leads to great waste and inefficiency. Having to admit this truth, the difficulty with such people is to draw the line between the domains of beneficial and mischievous competition. The English view of gas supply being equally opposed to the Continental concession system and the American plan of tolerating piracy in the name of competition, how can we reconcile the apparent inconsistencies of Free Trade and Protection as exemplified in the customs of our own and foreign industrial systems?

To anybody who has ever got so far into the study of competition as to have thoughts similar or analogous to that just expressed in the form of a question, the Leeds address of Professor Marshall will form instructive and interesting reading. And it will be strange if the perusal of this address does not inspire readers with the desire to learn more of the same wise teacher. He appeals, in an important section of his discourse, especially to those who are interested in gas supply and kindred undertakings. Take, for example, the following passage:—

> It is now universally recognized that there is a great increase in the number and importance of a class of industries which are often called monopolies, but which are perhaps better described as *indivisible* industries. Such are the industries that supply gas or water in any given area, for only one such company in any district can be given leave to break up the streets. Almost on the same footing are railways, tramways, electricity supply companies, and many others. Now, though there are some little differences of opinion among the economists of to-day as to the scale on which the owners of such undertakings when in private hands should be compensated for interference with what they had thought their vested rights, they all are agreed that such right of interference must be absolute, and the economists of to-day are eagerly inquiring what form it is most expedient for this interference to take. And here differences of opinion show themselves. The advantages of a bureaucratic Government appeal strongly to some classes of minds, among whom are to be included many German economists and a few of the younger American economists who have been much under German influence. But those in whom the Anglo-Saxon spirit is strongest would prefer that such undertakings, though always under public control, and sometimes even in public ownership, should whenever possible be worked and managed by private corporations. They believe that bureaucratic management is less suitable for Anglo-Saxons than for other races who are more patient and more easily contented, more submissive, and less full of initiative, who like to take things easily, and to spread their work out rather thinly over long hours. Without, therefore, expressing any opinion as to the advantages of the public management of indivisible undertakings on the Continent, the greater part of the younger English and American economists are inclined to oppose it for England and America. And though we recognize that the management of a vast undertaking by a public company has many of the characteristics of bureaucratic management, yet we think the former is distinctly the better suited for developing those faculties by which the Anglo-Saxon race has won its position in the world. We believe that a private company which stands to gain something by vigorous and efficient management, by promptness in inventing, as well as in adopting and perfecting improvements in processes and organization, will do much more for progress than a public department. Again, inferior as is a public company to a small private firm in its power and opportunities of finding out which among its employees have originating and constructive ability, a public department has much less still. And, lastly, it is more liable to have the efficiency of its management interfered with for the purpose of enabling other persons to gain the votes of their constituents on questions in which it has no direct concern; and as a corollary from this, it tends to promote the growth of political immorality, and it suffers from that growth. There is certainly a growing opinion among English and American economists that the State must keep a very tight hand on all industries in which competition is not an effective regulator; but this is the expression of a very different tone of thought from that which is leading so many German economists towards what is called State Socialism. In fact, English economists at all events are even more averse to State management than they were a few years ago; the set of their minds is rather towards inquiring how the advantages claimed for State management, without its chief evils, can be obtained even in what I have called indivisible industries. They are considering how a resolute intervention on the part of the State may best check the growth of *imperia in imperio*, and prevent private persons from obtaining an inordinate share of the gains arising from the development, through natural causes, of what are really semi-public concerns, at the same time that it leaves them sufficient freedom of initiative and sufficient security of gain by using that freedom energetically to develop what is most valuable in the energy and inventiveness of the Anglo-Saxon temper. But, though we dislike and fear the present tendency towards a widening of the area of public management of industries, we cannot ignore its actual strength. For more forethought and hard work are needed to arrange an effective public control over an undertaking than to put it bodily into the hands of a public department; and there is always a danger that in a time of hasty change the path of least resistance will be followed. By way of illustration of the inquiries that have had their origin in this fear of public management, as contrasted with public control, and public ownership, I would here mention a notion which has been suggested partly by the relations of some municipalities to their tramways, gas, and water works. At present it is in a very crude form, and not ready for immediate application; but it seems to have occurred independently to a good many people, and it may have an important future. It is that a public authority may be able to own the franchise and, in some cases, part of the fixed capital of a semi-public undertaking, and to lease them for a limited number of years to a corporation who shall be bound to perform services, or deliver goods, at a certain price and subject to certain other regulations, some of which may perhaps concern their relations to their employees; and, further, that competition for the franchise shall turn on the price or the quality, or both, of the services or the goods, rather than the annual sum paid for the lease. Competition as to quality is, from the consumer's point of view, often just as beneficial as competition as to price, and sometimes more so. And in industries which obey the law of increasing returns, as very many of these indivisible industries do, a reduction of price or an improvement of quality will confer on the consumer a benefit out of all proportion to the extra cost involved.

Professor Marshall has a good deal more of the same sort to say in other parts of his address—as, for instance, where he protests against excessively large combinations for trading or industrial purposes. He remarks that all the true benefits of concentration are attainable in many industries for a comparatively small capital; and declares it to be probable that "in many industries in which the average size of businesses has been recently increasing fast, a similar position of maximum economy will shortly be attained without any much further increase in size." And he lays his finger on an inherent weakness of excessively large business concerns when he says that "after all, what these very large public firms and combinations of firms have done has generally been only to turn to good account existing knowledge, and not to increase that knowledge." Discoveries of new industries and fresh outlets for trade are due in the main to individuals. "The chemist in his laboratory can make experiments on his own responsibility. If he had to ask leave from others at each step, he would go on but slowly; and

though the officials of a company may have some freedom to make experiments in detail, yet even as regards these they seldom have a strong incentive to exertion, and in great matters the freedom of experimenting lies only with those who undertake the responsibility of the business." This is only another way of protesting against the deadening influence of routine, which we are constantly doing.

Altogether, we are proud to claim that much of what Professor Marshall upheld before the British Association at Leeds with regard to the fundamental objections to the public control of gas undertakings, and the evil of unduly magnified establishments, is only what has been maintained in these columns for years past. If Professor Marshall had referred to the facts of the recent history of the town in which he was speaking, he might have been accused of generalizing upon a particular example; but as he may not have known anything of Leeds gas affairs, and certainly said nothing about the matter, our readers (who are familiar with them) are left free to ponder upon this striking local illustration of the truth of Professor Marshall's teaching. It is in no small degree gratifying to us to find that we have unwittingly been on the same side, with regard to a very important class of opinions, with an authority of such acknowledged eminence.

GAS ACTS FOR 1890.

In accordance with custom, we give a summary of the Private Acts of Parliament relating to the Gas Supply of the United Kingdom which were placed upon the Statute Book during last session. They are as follows:—

Only one Gas Company received incorporation with statutory powers by Act. This was the Falmouth Gas Company, which was formed as a limited company in 1866, with a share capital of £12,000. The Company have from time to time made extensions of works out of capital, until, by a structural valuation, these stand them in £15,000. By the Act the capital is fixed at £18,500, of which £12,000 is called original capital stock, and £1500 is improvement stock; both bearing 10 per cent. dividends. The remaining £5000 is new stock. Borrowing powers are granted to the extent of £3750 on the original, and one-fourth part of the new stock. Gas of 15-candle power is to be supplied, at a standard price of 4s. 2d. per 1000 cubic feet. A testing station may be established, at the expense of the Falmouth Corporation, at the Town Hall. Notwithstanding section 25 of the Gas-Works Clauses Act 1871, the Local Authority may, at their own option and expense, fix meters to the public lamps; purchasing any meters supplied for the same purpose by the Company. The Company may allow discounts not exceeding 20 per cent. for prompt payment of gas-rents or for large consumption. One clause of the Act provides that after the expiration of the running contract, the price to be charged by the Company for gas supplied to the public lamps is not to be in excess of that paid for the time being by any private consumer. Another clause requires the price for public lamps within the borough or parish to be 10 per cent. less than that charged to any private consumer. Powers of purchase within ten years are conferred upon the Local Authority, provided that the latter previously procure parliamentary permission for the purchase.

The Canterbury Gas and Water Act enables the Company to extend their works and to raise £36,000 of new "A" stock, with power to borrow one-fourth of the amount as raised. All the gas capital is limited to an 8 per cent. dividend. A sum of £2000 now standing to the credit of a depreciation account in the Company's books is to be transferred to the credit of the capital account, without dividend. The standard price of 15-candle gas is to be 3s. 4d. per 1000 cubic feet for gas supplied within a radius of 2640 yards from the Canterbury Guildhall, and 4s. per 1000 cubic feet beyond. The period of error in defective meters is defined as being the current quarter. The Company take power to refuse to sell gas to persons in debt for supplies to other property. With regard to deposits, the amount is made determinable, in case of dispute, by a Justice of the Peace; and interest at the rate of 4 per cent. is to be paid. The general meetings of the Company are to be held annually in February, instead of half yearly. The Clayton, Allerton, and Thornton Gas Act enables the Company to extend their works, and to raise fresh capital to the amount of £50,000, bearing a 7½ per cent. dividend whether issued as ordinary or preference capital, with power to borrow one-fourth part of the amount as raised, Gas of 15-candle power is to be sold. Auditors are exempted from the obligation to hold shares. The Derby Gas Act empowers the Company to purchase land, and construct certain railways for the service of their works. Additional share capital to the amount of £80,000, bearing 5 per cent. dividend, may be raised. and borrowing powers to the extent of £20,000 are granted. The maximum price of gas is fixed at 3s. 6d. per 1000 cubic feet. The gas to be supplied is to be of 15-candle power, and wholly free from sulphuretted hydrogen; and after the end of this year it must not contain more than 20 grains of sulphur per 100 cubic feet. The testing-place is to be within 200 yards of the Town Hall, and an hour's notice of the time of testing is to be given to the Company by the Corporation. Interest at the rate of 5 per cent. is payable on deposits. The Gravesend Gas Act extends the Company's limits to those of the Gravesend School Board district; empowers the Company to acquire additional lands and extend their works; and enables them to raise £25,000 of new 7½ per cent. capital in £20 shares, with power to borrow one-fourth part of the amount as raised. The sliding scale is applied, with 2s. 10d. per 1000 cubic feet as the standard price below which reductions will confer the right of increasing the dividend, while the price may rise to 3s. 3d. per 1000 cubic feet before the reduction of the dividend is obligatory. It is provided that sections 35 to 37 of the Gas-Works Clauses Act, 1847, are to be operative when the price of gas ranges between the aforesaid limits. Gas of 16-candle power is to be supplied, tested at the Town Hall or in the Market Place. The gas is to be wholly free from sulphuretted hydrogen; and after the beginning of 1892 it is not during the six summer months to contain more than 22 grains of sulphur per 100 cubic feet, nor more than 25 grains per 100 cubic feet in the winter. Two hours' notice of testing is to be given. It appears that the Company possess unappropriated profits amounting to £7000, which are to be paid over to the Corporation in ten equal annual instalments, and applied to the reduction of the price charged for the public lighting. It is made illegal for the Auditors to hold shares in the Company. The period of error in defective meters is restricted to the current quarter. Three days' notice is to be given, under a penalty of 40s., by any person before proceeding to connect or disconnect a meter. Interest at the rate of 5 per cent. is payable on deposits. The Hartlepool Gas and Water Act empowers the Company to purchase additional lands and construct gas-works thereon. The Luton Gas Act enables the Company to raise £40,000 of additional capital, to bear either 7 per cent. ordinary or 5 per cent. preference dividend, not more than one-half of the amount being issued in the latter form. Power is given to borrow one-fourth part of the amount of the new capital as raised. The standard price of gas is fixed at 4s. per 1000 cubic feet; the illuminating power being 16 candles tested at the works. The Company have received authority to apply for an Order or Licence, under the Electric Lighting Act; and also to supply gas-fittings, &c., which they could not do under their Act of 1858. Interest at the rate of 5 per cent. is to be paid on deposits. The Pontypool Gas and Water Act enables the Company to raise new capital amounting to £40,000 in shares, and £10,000 by borrowing. This capital appears to be undivided; but after the end of this year the accounts of the Company relating to gas and water are to be kept and returned for all public purposes as separate statements. The Ystrad Gas and Water Works Act empowers the Company to raise £70,000 of new share capital and to borrow one-fourth of the amount. Separate gas and water accounts are to be kept hereafter. The Ystradyfodwg Local Board have the right of purchasing the undertaking within six months after the passing of the Act, by giving one month's notice. The necessary powers are conferred upon the Board by the same Act. In a schedule appended to the Act, the memorandum of terms of purchase by the Local Board are set out in full. The price is stated to be fixable by agreement, or failing agreement, by arbitration in the manner provided by the Public Health Act, 1875. In case of arbitration, the price is to be ascertained on the net amount of profits actually earned by the Company for the five years preceding the passing of the Act; and the Local Board are not to plead insufficiency of supply, but for the purposes of the arbitration it is agreed that the Company have fairly met the demands of the district. The Act is not to enhance the value of the undertaking; but the actual cost of any new works executed, with interest thereon at 5 per cent. per annum, is to be paid by the Board. In the event of purchase, the Board are to pay the reasonable costs of obtaining the Act. The Local Board agree to take over the Company's debentures. The purchase is to be deemed a compulsory one; but the arbitrator, in making his award, is not to allow more than 10 per cent. on this account.

Among the Acts relating to Gas Companies, if not to gas supply, must be included the Sutton, Southcoates, and Drypool Gas (Electric Light) Act. This is an Act to authorize the Gas Company to accept from the Mayor, Aldermen, and Burgesses of the borough of Kingston-upon-Hull a transfer of some of the powers contained in the Kingston-upon-Hull Electric Lighting Order, 1890. It is enacted that in the event of the Corporation, by virtue of their Electric Lighting Order, and with the consent of the Board of Trade, transferring their powers under such Order, or any part thereof, to the Company, the latter may accept the transfer, and carry out the powers; appropriating for this purpose any of their gas lands, and setting apart for the same object so much of their authorized but unissued gas capital as may be required, to an amount not exceeding £40,000 in shares and £5000 by way of loan. The sum so appropriated is to be kept separate, and treated in every way as belonging to a special undertaking. The rate of dividend to be allowed thereon is to be agreed between the Company and the Corporation, subject to the consent of the Board of Trade. This agreement does not confer on the Gas Company any monopoly of electric lighting in the district.

The Gas Institute "Transactions."—We are asked to state that the publication of the volume of "Transactions" for the current year is being delayed owing to the business in connection with the incorporation of the Institute.

NOTES.

A Strain Indicator.

The designs of various strain indicators for showing movement in members of iron and steel structures have been described from time to time. The latest is illustrated in a recent issue of the *Annales des Ponts et Chaussées*. It is a simple instrument, intended to be fastened to scantlings required to be tested; and instead of being a mechanical arrangement of levers, like all its precursors of the same class, it is hydraulic. The change of distance between two points is magnified by the action of a piston or diaphragm of large cross section, the movement of which forces a liquid into a glass tube of very small calibre. Evidently any desired degree of delicacy may be obtained in an instrument of this kind. The memoir in question gives a record and description of several tests and experiments made with the instrument, which was originally intended for the examination of bridges and viaducts; but it is, of course, susceptible of application to any other structures of iron and steel, including gasholders, the exact movements of which under strain are as yet but imperfectly understood.

A Gas-Engine Modification.

In a recent issue of the *Engineer*, there appeared an article descriptive of some experiments on the gas-engine employed in Professor Lodge's laboratory at the Liverpool University College. This was one of the early forms of the Fawcett engine; but it has been altered to work on the Otto cycle. Part of the experiments were concerned with the time of ignition of the charge, which is an important point in a gas-engine. If the charge is ignited too early, the result is the well-known "thumping" effect. If the ignition is too late, the gas does not exert its full effect, and the bill becomes heavy. The importance of attaining maximum pressure at the begining of a stroke cannot be overrated. In these experiments, the slide-valve was first done away with, and a simple conical valve was made to admit the charge, and an electric spark to ignite it. The engine having this electric igniting machine attached, it was an easy matter to add an arrangement for varying the time of ignition, which was done with surprising effect. The engine became immediately under perfect control; the thumping and the exhaust noise could be abolished, and the engine caused to give a good diagram under every condition, with all speeds, and mixtures varying from the richest to the most dilute. It is done by exploding the gases while they are being compressed; the commencement of the explosion taking place while the piston is on its backward stroke. This early ignition is called, in Professor Lodge's laboratory, the "lead;" and for high-speed engines it is declared to be a necessity.

A Telethermometer.

Professor Puling has described, in the *Chemiker Zeitung*, a new thermometer designed to measure temperatures at a distance. It depends on the principle of using two electrical conductors, the resistances of which vary in different senses with increase of temperature. The instrument consists essentially of a thin glass tube, sealed at both ends, about 20 centimetres long by 8 millimetres in diameter. The tube contains a filament of carbon with a resistance, cold, of 163 ohms, and a spiral of fine iron wire of 26 ohms resistance. In order to obtain the highest conductibility, it is also filled with dry hydrogen. This arrangement is placed wherever the temperature is to be measured—as, for example, in a heap of coal. The recording station, which is in electrical connection with the indicating tube, contains a rheostat provided with a scale of temperatures, a sensitive galvanometer, and a Leclanché element. The connection is so made that the carbon, the iron wire, and the wire of the rheostat constitute a Wheatstone bridge. When the temperature rises, the resistance of the carbon diminishes and that of the iron wire rises. Consequently, the point of the rheostat which indicates no difference of potential varies. The temperature of the distance indicator is ascertained by determining with the rheostat the point of no difference of potential; and the instrument being suitably graduated, the temperature is read off directly. This instrument is called a "telethermometer."

Water Supply Systems Compared.

At the recent meeting of the American Society of Civil Engineers, Mr. J. Leland Fitzgerald read a paper devoted to a comparison, from the financial standpoint, of different systems of water supply to towns. The author compared the gravity system, reservoirs, and direct pumping; concluding that for large towns the efficiency of the two former is the same, while direct pumping is superior by 20 per cent. The advantages of reservoirs are better fire protection, economy in running expenses, and purer water. Mr. Fitzgerald declared that, whatever the size of the town, a gravity system of supply is preferable whenever the following conditions are all fulfilled: A supply of unquestioned present and future purity; quantity sufficient for the needs of the next 20 years without great additional outlay; and the original cost such that 8 per cent. thereon is not in excess of 60 per cent. of the total working expenses, including interest and sinking fund. A direct-pumping system is the most economical when the town is large enough to take half a million gallons and upwards daily; when the supply is good and abundant, although found at a low level; and when there are no great differences of level in the distribution system. If there are highly elevated portions of the same district, these, if small, are best supplied from a separate reservoir fed by a force main. When the consumption of a district is less than half a million gallons daily, direct pumping with a reservoir of at least 20 hours' capacity, situated in the distribution system, is the most economical. When a town supply is intermittent, of course a reservoir capacity sufficient to afford the requisite storeage for periods of drought is necessary. Although the author admitted that no hard-and-fast rule can be made in a matter of this sort, yet a few general principles like the foregoing are useful aids to the treatment of doubtful cases.

COMMUNICATED ARTICLE.

THE CHEMISTRY OF ILLUMINATING GAS.

By Norton H. Humphrys, Assoc. M. Inst. C.E., F.C.S.

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The calculations as to secondary action that have just been given refer to a retort of equal transverse section throughout, and to a charge laid evenly in all parts. In practice, there are two causes that tend to reduce the objectionable degree of secondary action at the back part of the retort. The deposition of carbon takes place more rapidly at the back than at the front, thus reducing the area above the charge at that point; and the coal is usually laid in rather more thickly at the back than at the front. The stoker who charges with a shovel takes care to get the back of the retort well filled; and where the scoop is used, the impetus given to that apparatus when driving it into the retort, tends to keep the coal towards the back. So that in the average of ordinary working, the gas-way above the coal is not of equal area throughout, but tends to taper or reduce from front to back. It is interesting to notice that carbon in the retort is not altogether an enemy. It is liable to be deposited more rapidly in the hottest parts of the retort, where the objectionable degree of secondary action is most likely to occur. It thus acts as a friend in equalizing the temperature prevailing in the interior of the retort, and tending to reduce the further progress of that secondary action that has resulted in its own formation. The positive secondary action is chiefly confined to heavy vapours passing off at a comparatively low temperature. A good permanent gas is not in any way benefited by exposure to secondary action. It is true that a gas, by exposure to heat, may be increased in bulk by the decomposition of some of its constituents into lower members of their series, having lesser specific gravities. But this decomposition is always attended by deposition of carbon and loss of illuminating value. Once granted that a permanent gas is secured, the sooner that gas is removed away from the influence of temperatures approaching anywhere near to that at which it was generated, the better. These considerations fully explain how it is that a better illuminating value, as shown by quality multiplied into quantity, is now obtained from coal—notwithstanding the higher heats that are now almost universally used—than was formerly the case.

It would appear that in the ordinary 9 feet horizontal retort there is too much negative secondary action in the back part, and not sufficient positive action in the front. The back part of the charge, not being subjected to the cooling influence exerted by the metal of the mouthpiece and ascension pipe, would gain temperature more rapidly, and therefore give off a much less quantity of heavy vapours, than the front. This brings us round to the oft-repeated maxim that the gas should be taken off from the hottest part of the retort; and if it were possible to overcome the practical difficulties in the way of removing the gas at the back, instead of at the mouthpiece, by means of pipes so protected as to reduce the loss by conduction and radiation of heat drawn from the body of the retort to a minimum, there would be reason to expect a great improvement in results, due to an increase of positive, attended with a decrease of negative secondary action. Careful investigation into the yield and quality of gas formed during successive periods of carbonization would afford a useful insight into these matters.

We are so accustomed to talk of the yield of tar in the course of the manufacture of illuminating gas, that it has come to be generally regarded as a considerable component of the results of the distillation. It is generally understood that the formation of tar is principally confined to the first part of the carbonization; but many would assume that it is regularly formed in greater or less quantity throughout the working. I am unable to meet with any results showing the production of tar at successive periods of the charge; but having regard to its small bulk—a barrowful of coal only yields about a gallon of tar—am rather inclined to regard its formation as an accidental circumstance, due to the fact that some portions of the charge, at any rate, are heated very slowly, and do not reach the gasification point until some hours after being introduced into the retort. If we carbonize coal in thin layers, say one to two inches thick, at good heats, the yield of tar is practically *nil*. The formation of tar is in itself an evidence of insufficient positive secondary action; but it is difficult to remedy this without at the same time increasing the objectionable negative secondary action.

Unfortunately the primary action, and the two kinds of

secondary action, are so intermixed during the act of distillation in the ordinary way, that it is impossible to separate one from the other. The gas that we secure is the ultimate result of a large number of reactions, some of which are beneficial as regards the yield of illuminating value from the coal, and others are exactly the reverse. We can only judge, inferentially, as to the influence of each factor by a number of experiments conducted under widely varying conditions, in connection with those points to which attention has just been directed, such as the various dimensions of the retort, and bulk of charge compared with the cubical contents of the retort, especially as regards the area and also the shape of the gas-way. The position of the eduction pipe, and also that of the lid for charging and discharging the retort, might also be considered in connection with their effect in drawing away heat by conduction from the parts of the retort adjacent to them.

The influence exerted by moisture, if present in the charge of coal, is evidently of a prejudicial character. It has been shown that the sooner, after the introduction of the charge, the point of gasification is attained in the interior of the retort, the better for the ultimate result; but the presence of a liquid, such as water, which vaporizes at a comparatively low temperature, and absorbs large quantities of heat in doing so, will postpone the reaching of that point until the heat required to convert the water into steam has been supplied. Any foreign matter of a solid character—like mineral matter in the form of ash, and even the excess of carbon that remains behind in a non-volatile form as coke—must also exert a similar action, though to a less extent. The whole bulk, whether volatile or not, must be heated together. Therefore we find that coals rich in volatile matter, or, in ordinary language, good gas coals, give off their gas freer, and require less heat to carbonize them, than coals of an inferior quality.

The manner in which the heat for carbonizing the coal is generated—viz., by means of a furnace, exterior to the retort—is obviously extremely wasteful. The purpose for which the heat is required is to raise the coal to gasification point, and to supply the heat absorbed or rendered latent during the act of gasification. But a large number of sources of waste—such as radiation and conduction from the exterior surface of the setting, and the chimney gases, which must necessarily escape at a moderately high temperature—are unavoidable. Looking at the fact that in spite of these losses, the fuel account in the retort-house has been reduced to moderate limits, there is reason to believe that the actual quantity of heat used in raising the temperature of the coal, breaking up the volatile constituents into gas, and raising them to the temperature at which they leave the retort, is comparatively small. It therefore affords promise, by improvements in apparatus and furnaces, of a still further reduction of the fuel account for carbonization. Even with the best arrangements, the loss by radiation and conduction from the exterior surfaces is very considerable; and therefore the increase of the duty obtainable per retort is to be credited with a large share of the economies that have already been obtained, as obtaining double the amount of duty per unit of exterior surface, or, in other words, reducing the amount of exterior surface about one-half, as compared with the work done. It may be hoped that further improvement will be made in this direction, and that the heat which at present goes to render the atmosphere of the retort-house oppressive, will be diverted into more useful channels.

Whilst modern practice in the distillation of coal is moving in the direction of reducing the secondary action, so far as the ordinary retorts are concerned, that in connection with the manufacture of gas from oil or petroleum appears to move in the opposite way. It is a very general thing to find, where fluid hydrocarbons are used as the material, that a second retort is added, as in the Pintsch apparatus, or that the oil gas is subsequently passed through an empty retort heated to redness, or a chamber packed with a chequer-work of fire-bricks and heated to a high temperature, in order to "fix" it. Even the oil gas produced by injecting the fluid at the upper part of a water-gas cupola, where it is exposed to a very intense heat, is supposed to need a subsequent "fixing." Opinions, however, are not unanimous on this point. According to some systems of apparatus, the oil gas is not subjected to a greater degree of secondary action than would obtain in an ordinary retort; while others include the use of a superheater two or three times as large as the generating vessel. Perhaps the reason of this is that the oil gas as generated is too rich for general use, without being either diluted or decomposed into poorer gases. Any "superheating" process must necessarily be attended with deposition of carbon, and loss of illuminating value. In the water-gas system, the carbon can be burnt away after each run, and thus prevented from accumulating to such an extent as to interfere with the proper working of the apparatus; but the fluid hydrocarbon which is employed must be very cheap in the first place, if the process is to be a commercial success.

Gas-Testing Candles.—Among the prospective arrangements for the forthcoming session of the London Section of the Society of Chemical Industry, it is announced that, on the evening of Jan. 5, Mr. W. C. Young, one of the Metropolitan Gas Examiners, will read a paper on "Standard Sperm Candles."

TECHNICAL RECORD.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

In the JOURNAL last Tuesday, we gave a report of the general business transacted at the half-yearly meeting of the above Association, held at North Shields on the previous Saturday, together with the Inaugural Address of the President (Mr. W. Hardie, jun., the Engineer of the Tynemouth Gas Company). An interesting portion of the proceedings was the discussion opened by Mr. T. Bower, of West Hartlepool, on the question of whether the price of gas should be raised, in order to meet the increased cost of coal; but the heavy demand on our space last week compelled us to hold over until to-day the publication of the following report of the remarks made by the various speakers.

THE INCREASE IN THE PRICE OF COAL: SHOULD THE PRICE OF GAS BE RAISED?

Mr. BOWER's introductory remarks were as follows:—Sometime ago, when the Committee of this Association had difficulty in obtaining papers for their meetings, it was suggested that questions or short discussions upon matters connected with the gas industry might not only benefit the Association, but would give to some of our members who do not care to read a paper, better facilities to introduce minor subjects, and to join in the discussions thereon. Acting on this suggestion, I desire to-day to bring before you a matter upon which no doubt all of us have of late had more or less anxiety, and which seems to me to be a subject in which we are all more or less interested—viz., the increased cost of coal and labour that has recently taken place, and how best to meet the additional outlay. Without giving any names, I will briefly state the increase in cost of coal and labour that has taken place during the past twelve months at three works in which I am interested.

	Increase in Coal. Per Cent.	Increase in Labour. Per Cent.
No. 1	51	15
No. 2	44	20
No. 3	78	10

These works make about 240, 70, and 2 million cubic feet per annum respectively; and such increases are equal in the first case to nearly 6d., in the second to about 5d., and in the third to as much as 10d. per 1000 cubic feet of gas sold. If from these figures be deducted the increased amounts received for coke, tar, and other residuals over the same period, the actual deficiency per 1000 cubic feet of gas sold is about 4d., 3¼d., and 9d. respectively. Possibly some of you have had greater increases to contend with than those given; while others may be in the fortunate position of having had less. I trust, however, that all the members will give us their experience, and also offer any suggestions as to what they consider the most desirable way of making good this deficiency. It may be said that the easiest way out of the difficulty is to at once raise the price of gas to such a figure as will cover our diminished receipts; and were we to follow the example recently set by one or two of the largest gas undertakings, I fear such increases would soon become general, and that we in the North of England would soon lose the reputation we have so long enjoyed of supplying cheap gas. Personally, I am of opinion that this is the very last step a gas company or corporation should take; and that before the price of gas is increased, every other method to popularize the use of gas and residual products, and thereby increase the consumption and the company's revenue, and better enable it to meet its increased liabilities, should be resorted to. To meet this increased expenditure, I would also draw upon the reserve funds and floating balances (where such funds are available), and in every possible way would utilize all my resources before increasing the price to the consumer; believing, as I do, that an increased price not only means a diminished consumption, but it would in these days of keen competition give to our competitors an advantage of which they would not be slow to avail themselves. On the other hand, I do not think that the public desire gas companies to keep the price of gas so low that the margin of profit will not enable them to pay their shareholders a reasonable dividend. Certainly the public want cheap gas; and I think no one will deny the fact that, for some years back, they have in the majority of cases had it—a state of things that has been conducive to the mutual advantage of both seller and consumer, and which has been amply proved on the one hand by the repeated reductions that have taken place in the price of gas, and on the other by the increased favour in which gas stock has been held as an investment by the public themselves, and its consequent enhanced value as these reductions have taken place. Should, however, circumstances—such as increases in the price of coal and labour, over which gas companies themselves have little or no control—place them in the position of having reduced profits that will not enable them to pay their shareholders dividends, and it be clearly put before the public that before asking the consumers to bear any portion of this increased cost, they had utilized all the resources at their command, I venture to think that the public would so far remember and appreciate

the many reductions that had previously been given in their favour, and would pay with as good a grace as possible any small additional charge it might be found necessary to make. I would like to remove an impression which seems to have gained ground, that I should read to-day a paper. This was not contemplated. My whole object has been to raise a discussion upon this matter, which, I think, concerns us all, with a view to elucidate the views of my brother-managers, and also to lay before the public exactly the position in which we, as gas managers, are placed and to see if it be really necessary for us to take some steps to increase the price of gas, in order that we should to some extent be prepared for what is coming. It is a well-known fact that the public do not take kindly to an increase in the price of anything; and this is a matter which does not only concern gas manufacture, but more or less affects anything we have to go into the market to purchase. I think if the public are shown that, before taking any steps towards an increase in the price of gas, we are doing all we can in the way of working our resources, we may sit still, conscious that we have done our part, and that only then do we go to our consumers, and ask them to pay more for the commodity they are receiving. I venture to say it will do considerable good to gas managers if this were sufficiently pointed out to the public, and made plain to them. I trust that the discussion which we may have will assist in doing this; and the end which I contemplated in starting this discussion will then be served.

The PRESIDENT said he was sure the members were very pleased that Mr. Bower had introduced the subject under consideration in the able manner he had done. The question was certainly one worth discussing. It was a most important one—in fact, *the* most important they had at present to deal with; and he hoped the members would give their opinions upon it.

Mr. J. HEPWORTH (Carlisle) said that Mr. Bower had introduced the question very ably, and had put into his remarks all the considerations which came into one's mind on the subject. They were all quite convinced that the cost of coal, and the cost of labour were the two factors which operated in bringing about an increase in the price of gas. He thought one might consider how far these causes were likely to be permanent, before coming to the conclusion that an advance in the price of gas was inevitable. There were those of them, probably, who considered that the rise of wages, both to coal-miners and to their own workmen was reasonable, and in many cases unavoidable. But there were some who also probably thought that the increase in the price of coal, if it were inevitable, was, at all events, too great to correspond with the advance that was made in wages and on the cost of pit plant. He considered that, when things were looking better, and everything seemed to be tending towards an advance, those who had an article to sell should seek to make the most of it. As the members knew, there had been an enlarged demand for coal; and there was a tendency on the part of coal-owners to make an unreasonable addition to the price of their coal. The question, however, had two sides, because anyone who had any knowledge at all of the coal market must know that coal-masters had had a bad time for some years past; and they might conclude that, if a good time came to them, when they could increase their profits so as to cover the years of bad times, there was some legitimate excuse for them trying to make the most of it. In so far as the advance in price was excessive, he believed they might fairly be convinced that it required only a little time to correct itself, and that those prices would soon cease to exist, and they would be able to purchase coal again at a reduced figure. This was a consideration which should operate in the mind of all gas managers, before they advised their directors or committees to advance the price of gas. He therefore entirely agreed with Mr. Bower in thinking they should exhaust all the means in their power to prevent an increase. There were two ways in which, in this time of high prices, it could be done. They could recommend a diminution of dividends (and to a limited extent he did not think this would be an unreasonable thing); or, in cases where gas was supplied of more than average quality, he would be quite disposed to recommend a slight reduction in quality. This, perhaps, would not be very popular; but he did not think it would be a great hardship if their shareholders were prepared, alongside of it, to take a lower dividend for a time. There was one reason which occurred to him that might justify an increase in the price of gas over and above anything which had been stated; and that was, if times were prosperous and both men and masters were earning more, they ought probably to be willing to pay rather more for gas. He thought they ought to be; but this, he was afraid, was one of the things of which one could not convince the public. At the same time it ought to be the case that, if prices were going up all round, people should be prepared to pay a higher price for their gas. But, as Mr. Bower had pointed out, they must also, before they recommended any advance in price, take into consideration the effect which it would be likely to produce. Every day, probably, some of them had the question of competition before them, either from electric lighting or from the cheapened oil light. Everything they did to increase the price of gas brought the competition still closer to them; and for this reason, if for no other, they should be disposed to follow the advice of Mr. Bower when he told them not to advance the price of gas too soon. He was intimately acquainted with one corporation where the advance in the price of coal alone represented an increase of 6d. per 1000 cubic feet of gas; and labour would certainly cost not less than an additional 1d. or 1½d. per 1000 feet. But the corporation had thought it advisable not to increase the price of gas, but to reduce the profits. If a concern had been making profits amounting to £7000 or £8000 a year, and could afford to drop (say) £3000 of that, he thought it was perfectly justified in doing so, in the hope that in a few years a reduction in the price of coal might, to some extent, take place; and if it did not occur, the question would arise whether the price of gas should not be advanced, in order to cover the increased cost. He did not think they could have had a more suitable subject than the one Mr. Bower had introduced. He hoped the discussion might have the effect of informing the minds of gas consumers generally on this important question, and that they would see that, at all events, there was a disposition on the part of gas managers to exhaust all the resources of civilization before they proposed the extreme step of advancing the price of gas.

Mr. H. TOBEY (Malton) said that his directors were some time ago contemplating a reduction in the price of gas; but the disturbed state of the coal market induced them to hold their hands, and to wait till they saw what would take place with regard to the price of coal. There had since then been a total advance of something like 2s. 7d. or 2s. 8d. per ton; and his Board, being very much adverse to increasing the charge for gas, had decided to tide over the matter as best they could. It was certainly desirable, he thought, that the price should not be raised, if it could possibly be avoided. What they should look at was whether the rise in the price of coal was likely to be permanent or temporary. To ascertain this, it would be necessary to inquire into the alleged cause for the rise, and also whether the prices which were obtained by colliery-owners would not eventually end in such an amount of capital being invested in collieries as would bring down prices again. They were all aware that, where there was a high return for capital, there was a rush to share in the augmented profits; and they also knew that, where labour was highly paid for, it flocked to that place, and there was then a tendency to bring down prices. Taking this into consideration, he thought it was probable they might return to a reasonable price for coal. In 1874, at the time of the coal famine, the price rushed up, but did not continue high for very long. Capital and labour were drawn into the coal market; and prices very shortly had a downward tendency. In fact, he believed they reached a lower figure than they had before the time of the inflation. But, looking at the present question, he thought it was very evident they did not stand upon the same footing now. In regard to statutory gas companies, they had the old 10 per cent. dividend; but, on the other hand, there were the modern sliding-scale companies. The old-fashioned companies, it would appear, in order to meet the increased cost of production, had only to raise the price of gas by 2d. or 3d. per 1000 cubic feet. But the sliding-scale companies stood in a different position, because if they raised the price the dividend came down in proportion; so that they really would be punished at once. Probably when everything was taken into account, they would stand as well as the old companies, as most of them had been supplying gas at a price below their standard rate; and therefore if they were brought back to the standard rate of 10 per cent., they would not have much cause for complaint. It seemed to him that corporations had very little difficulty in this matter; because if they advanced the price of gas by 2d. or 3d., it only meant so much less contribution to the rates of the town, and the public did not look upon it exactly in the same light as if a company raised the price. It was part of their own property; and they did not view the rise with the same amount of ill-feeling as they did when it was brought about by a private company. He agreed with Mr. Bower entirely that it was not politic to raise the price; that it was a very great mistake, if it could possibly be avoided; and that it was better to apply to the reserve fund and other sources to tide over present difficulties. Then, if the rise should be only temporary, they would soon get over it; but if it should be permanent, they would require to face the situation, and to advance the price if it were found necessary. They should protest against the idea that gas companies had a divine right to a 10 per cent. dividend. The public would heartily agree with Mr. Bower as to the liability of gas companies and gas undertakings generally to suffer from the advanced price of coal and the increased cost of manufacture. In large towns, where the gas consumption went up by leaps and bounds, an increase in the price of gas would have little appreciable effect; but in rural towns it would lead to such a shrinkage in the gas consumption that there would be no actual falling back in the business. Gas managers in small towns such as the one he was employed in, who advanced the price of gas, would have to calculate upon a decrease of from 3 to 5 per cent. in consumption; and they would have to meet this in any advance in the price of gas which they might propose.

Mr. W. FORD (Stockton) said they had been shown the means which they could use, in a small way, to keep down the price of gas; and Mr. Bower had pointed out that it would not be consistent with their position as gas sellers to advance the price, if the present increased cost of coal was not to be of a permanent nature. It might not be permanent with certain classes

of coal; but situated as some of them were, in the midst of iron and steel industries, it looked as if it would be so for them. Within the last twenty years or more, a great alteration had taken place in the use of gas coal. To his knowledge, twenty years ago, gas coal was only used for light-producing purposes. Since then an enormous difference had taken place, in connection with its use in steel making. The industry was still growing, and was likely to grow; because in his judgment steel was to supplant the use of iron for nearly all the ordinary purposes to which iron had hitherto been applied. Taking this into account, he must conclude that gas coal was likely to have a permanent rise in price above what it had been during the past twenty years. Although the Stockton Gas Committee were not inclined to raise the price of gas, he had told them it was their duty not to do so, as being a corporate body, their duty was to share the losses with the consumers. Seeing that they had handed over large surplus profit in past years to non-consumers, he considered, in justice to their consumers they ought not to raise the price until it should be seen whether the increase in the cost of coal was to be permanent. He could not see how, as sellers, they could, under such competition as they were subjected to, advance the price of gas, and hope, as Mr. Tobey had said, to continue their maximum consumption. With the one exception of the application of gas coal for the production of Wilson gas, used in the manufacture of steel, they had a fair field and no favour; but he was sure his friends would agree with him that they must take into account the enormous extraction of coal for uses to which it was not put twenty years ago. He was sure they would all advise their companies and corporations to do everything possible before advancing the charge for gas. He thought in the case of gas companies, even if they could not maintain their maximum dividends, they would not be helping the electric light, nor the oil trade, if they kept to their present price, because gas was so handy that it was bound to hold a place in this great commercial country.

Mr. J. C. Watson (of Messrs. Johnson and Co., cement manufacturers, of Gateshead) said that gas companies were, to a certain extent, in the same position as the coal companies were before the rise. For several years coal-owners lost money in many instances; and gas companies were all the while making a great deal. In his opinion, the present rise was inevitable. But he thought it was only going to be temporary; and in that case he considered that the directors and the shareholders of gas companies should be content with a slightly decreased dividend. They certainly should not raise the price of gas, nor of residual products. They might be sure of this, that the one thing to make an article popular was increased consumption; and at the present time, with electric lighting and water gas, as well as other materials, running them very hard, it would be fatal to the popularity of gas, to raise the price. Likewise, he believed, it would be fatal to residual products if they were to let them bear the burden. He thought the point had not been made strong enough, that gas companies should take their turn in bearing losses as well as other manufacturing concerns, and be content with a fairly good year now and again.

Mr. W. J. Warner (South Shields) suggested that the last speaker was not a gas shareholder; but he might be a consumer of residual products. (Laughter.) It must not be forgotten that gas companies were also very large consumers of residual products. They used a great deal of coke which they produced; and therefore if coke, in times of low-priced coal, was worth 7s. a ton, it was worth only 7s. a ton to the gas manufacturing consumer—the company itself. But if it went up to 14s. a ton, the company had to pay 14s. a ton for the fuel, the same as other people. He thought Mr. Ford had done a considerable amount of service to them and to the public in general in his reference to a largely-increased consumption of gas coal for other purposes than gas-making. Personally, he was greatly indebted to him for it. However, he thought this had not permanently affected the cost of coal. For the present price he thought there were other causes, one of which was the disturbed condition of Continental trade. Just as it had been admitted that the Franco-German War was the cause of a great rush out of the country of gas coal to meet the diminished stocks on the Continent, so, in like manner, had the prices been enhanced by the present enlarged demand. They should remember it had not been a gradual growth, but a sudden rise. If it had been the increased consumption of gas coal for the manufacture of steel, he would have expected the additional demand to have been gradual. But this was not the case; it had jumped up by 50 or 60 per cent., and even more than that. To return again to the question of dividends, he might say there was a general feeling that a dividend was a thing people were not entitled to. "The shareholder," it was said, "has got plenty of money." Probably people thought of a shareholder as a millionaire, or something of that sort. They forgot the number of small, retired tradespeople who had invested their life's savings and scrapings in what they considered the surest market, and were now entirely dependent on their investments for their maintenance. It was not to them a matter of a few pounds, more or less, in their pocket, but it affected their position; and, therefore, he said that dividends ought to be maintained. And, again, it should be remembered that the dividends which were paid were in many cases merely nominal dividends; they were not actual. The 10 per cent. to which someone referred as a divine right, was nothing of the kind. In the case of nearly all the companies which were in a good position, anyone could see their quotations. For £100 of stock they would see £200, or something like that figure, quoted. Where was the 10 per cent. then? It meant 5 per cent. To reduce the dividend would, therefore, seriously affect the position of many people who were well-to-do only upon the dividends they received. He would like to pay a well-deserved compliment to a well-known name, perhaps the most highly-respected name ever associated with gas companies—Mr. George Livesey. He believed that Mr. Livesey long, long years past, foresaw the present position of things, and that he helped to consolidate matters and make them permanent by that splendid idea of the sliding scale. Did it not come into play on such an occasion as this? They had the capitalist, on the one hand, seeking profits; and, on the other hand, the consumer. A gas company, like all other commercial undertakings, must be made to pay. Therefore, it was necessary at times to increase the price; and in increasing it the profits were reduced by the action of the sliding scale. Both classes alike had for years reaped the benefit in good times; and both alike must suffer now. The beautiful principle came into play now that profits were likely to be less; and he believed it would be more highly valued than it had ever been. He would like to say another word about Mr. Livesey. He had now completed his beautiful system by taking the gas worker into his union—a union of capital and labour, producer and consumer together, where all alike received the same, according to the good or the bad times. This was a very different union from what many of the gas workers would like to have. It was a most beautiful system; and the more widely it was adopted, the better would be the position of both producer and consumer. It should be borne in mind that loss to gas companies was not a new thing. For four or five years, they had been suffering from loss of revenue. They would remember that tar went down, within a year or two, from something like 3d. a gallon to about ¾d. a gallon. When they remembered that six, eight, or ten gallons of tar were produced from a ton of coal, they saw clearly how this affected the position of gas companies. Only a few years ago sulphate of ammonia was never dreamt of at any other price than about 16s. per ton. What was it now? Little more than half that sum. These were things that could not be fought against. In the company with which he was associated, their reserve was full some four or five years ago; now it had been entirely exhausted. They had done as they naturally would do, and, as he believed, all commercial undertakings would do—the best for themselves, and the best for their consumers. The best for themselves was not to lessen the sale of that which they produced; and therefore he thought they were in the position of being able to say that they had done the best for the consumers as well as for themselves.

Mr. W. Hardie, sen. (Newcastle-on-Tyne), said he would not have risen, but Mr. Bower had just asked him how they were getting along in Newcastle. He remembered, a great many years ago, when he became Secretary to the Newcastle Gas Company, that they were paying for coal 12s. a chaldron of 53 cwt., which was equal to 4s. 6d. per ton. They paid their stokers 23s. a week, working twelve-hour shifts for seven days a week; and the price of gas was 4s. per 1000 cubic feet. Now they were giving 9s. per ton for coal (it would be dearer next year), and they were paying their stokers 40s. per week, working eight-hour shifts (nearly three times what they formerly paid); and they were selling gas at 2s. per 1000 cubic feet. If things had continued as they were, they would have been selling gas now for nothing, and making a profit out of it. (Laughter.) A great change had come over the situation. However, he did not take a despondent view of matters. The very fact that they were paying such large prices for materials and labour had set men thinking; and they found experiments being conducted, in London and elsewhere, to see whether the cost of producing gas could not be reduced. What with inclined retorts, and new modes of setting them, and improved machinery, he thought there was still hope of the price of gas being kept to the moderate sum at which it was now. He did not think the present value of coal could be maintained. Coal-owners said that it would be; but with them, of course, the wish was father to the thought. Six shillings per ton might be too low a price; but 11s. was too high. He had no doubt that coal would find its proper level, as regarded price, by and by. The question of raising the charge for gas was one which, of course, could not be settled by them. It would have to be fixed by directors and committees; and no doubt those bodies would wait anxiously for the result of this year's working, and would give the matter their earnest consideration. He could not agree with Mr. Watson at all. A low price for gas, he did not think could be maintained, unless they made it up out of the residual products. With an increased price for coke and tar, they had a better chance of keeping down the price of gas than they would have by reducing the price of these products. The discussion, he trusted, might be of use to the members, in enabling them to come to a decision on the very important question before them.

Mr. J. Whyte (Seaham Harbour) said he had heard a good deal among the labouring classes in regard to the fabulous prices coal-owners were getting for coal, and that their increase in wages bore no proportion to the price. It was all put down as the masters' fault; but he did not think it was their fault altogether. He believed gas managers had had something to

with it. There were two or three ways of looking at it. In his own case, he was paying 13s. 6d. per ton for coal; while other gas companies were receiving the same coal for about 6s. 6d. per ton. Now, whose fault was that? (Laughter.) This was one of the reasons why he thought the masters should not altogether be blamed. Contracts for three or five years had a good deal to do with it; and his idea was that, if contracts had been made for a year only, they would not have had the great jump in price they had experienced. Masters could not increase their prices when contracts were running; and he had no doubt that some of the coal-owners in that district were supplying coal at a very considerable loss.

Mr. J. H. Cox (Sunderland) said that in 1873 and 1874 there was a great rush of people into the coal trade. They took up royalties and sank new pits, and extended in all directions. But he was not aware this had been the case on the present occasion. If the demand for coal was increased really beyond the powers of production of the working collieries, and there were no new collieries in hand, that was a strong argument to him that the price of coal would never reach the low level from which it had sprung, No donbt it would be reduced to some extent; but certainly not to a price like 6s. per ton, which was the ordinary figure paid last year.

Mr. TOBEY, replying to Mr. Cox, said the rise had only taken place within the last two years; and there had been hardly time to sink new pits. The recent experience of colliery proprietors had been such that people had been chary of rushing into the coal trade; but if the price kept up, the rush would come.

Mr. Cox mentioned that he suggested this matter to some colliery owners not long ago; and one of them told him that, from his experience, one reason why there had been no rush into fresh places was that there was not coal to be had in that district.

Mr. R. J. WOERTH (Stockton), referring to the use of steam in gas-works, said it was used in an extravagant way. It was used at a pressure not exceeding 30 lbs. to the square inch; and no engineer could possibly make an engine which would be profitable at that pressure. In Stockton, there was one engine in which the consumption of coal was 28 lbs. per horse-power. In other engines in gas-works he had seen the consumption at 20, 18, and 16 lbs. per horse-power; and in one as much as 56 lbs. In all cases the pressure was too low, and the engine much too big for the work. Some little saving might be effected in the use of steam in gas-works if they allowed the engineer a freer hand with regard to boiler pressure.

Mr. WATSON explained, in reply to Mr. Warner, that what he wished to convey was that when they thought it would be fatal to the popularity of gas to raise the price, he contended that they also ran the risk of killing the popularity of residual products by increasing their price.

Mr. WARNER asked if the consumption of coal per horse power in steam-boilers was not to a considerable extent dependent upon the quality of the coal?

Mr. WOERTH stated that it was; but that, with a pressure of 140 lbs., it was possible to cut down the consumption per horse power to as low as 2½ lbs.

Mr. J. A. G. ROSS (Newcastle) said there was a great deal in what Mr. Woerth had said; but there were many circumstances connected with steam-boilers, and many more unconnected with them, which made it really an infinitesimal portion of the great question before them, though, for engineers, it was a very important matter, because they had to face the question of the decreased supply of coal. Taking this into consideration, and the increased demand from our advancing Colonial Empire, he thought it was a certainty that the price of coal would increase. In addition to what he had mentioned, they had to take into account the exorbitant demands made by the domineering power of Trades Unions, both in connection with gas companies and coal mines.

Mr. BOWMAN (Whitburn) said that, as the representative of perhaps the smallest gas company in the neighbourhood, he was in a position to know something about the coal trade. In the last six years, there had not been a single new colliery started. About six years ago eight collieries were closed; and since then six of them had been re-opened.

Mr. BOWER, in closing the discussion, said he was very glad indeed that the subject he put before them had led to the discussion which they had just had; and he did not think that any reply he was able to give would add very much to what had been so ably said by others. One or two matters had been very clearly put before the members, and particularly the one Mr. Ford referred to—that gas coal was being used for other purposes than gas making. He could bear this out, and would just like to state also that, in his opinion, the coal in the North of England had risen in considerably greater ratio than it had in other parts of Great Britain. Take, for instance, what Mr. Tobey had told them. He spoke of a rise of 2s. 7d. or 2s. 8d. per ton. He himself was personally acquainted with two or three gas companies in Yorkshire where the increase had been from about 2s. to 3s. per ton. Now, many of them in the North would have been very glad indeed if such an increase only had taken place; but the money value of the advance, in some cases, was about 6s. per ton. One of the main reasons for this, he believed, was that which Mr. Ford had stated. The President, in his address, mentioned one matter which had not been greatly touched upon; and that was something which took place at the Manchester meeting recently with respect to distilling tar by gas managers. He (Mr. Bower) was in a position for seven years, of having to distill not only all the tar at his own works, but also from several of the smaller works surrounding; and he could bear out what had been stated, that there was a very desirable profit to be made by gas managers distilling their own tar. But, on the other hand, he must distinctly say that he could not advise any gas manager to go into tar distilling as a trade. His reasons were that it was a very dirty trade, if he might use that expression; and it was a very risky one. It was one altogether out of the province of a gas manager to enter into. There certainly might be exceptional cases where it might be thought desirable for a gas manager to take it up. A place he had in his mind's eye as suitable would be a seaport town, where the bulk of the tar had to be used for asphalting purposes. As a matter of fact, asphalters had to go to the tar distiller and get the tar after the light hydrocarbons were taken out; and they had to pay an increased price for it. A gas manager might in these circumstances, get from 10s. to 15s. a ton out of his tar; and it would be worth to him another 10s. for that purpose. Mr. Tobey spoke about the divine 10 per cent. dividend of gas companies. As a matter of fact, his own company had known nothing at all of a 10 per cent. dividend for a considerable time. They just had a taste of it for two half years. The dividend of the bulk of the gas companies was only 7 per cent. He took it that, if the shareholders could get anything like 7 per cent., they were not suffering very much. Certainly, there were the reasons mentioned by Mr. Warner, of stock going into the market, which made it appear as though it were receiving 7 per cent. dividend, when it only realized 4 or 4½ per cent. But there was another view of this matter which had been brought before him that morning; and it was this, that while gas companies were looking to the increased consumption, and all the other facilities they might obtain by not increasing the price of gas, they must also safeguard the interests of their shareholders. He was a small shareholder in a company which for many years had paid a maximum dividend of 8 per cent. They had sailed very close to the wind for several years, and had been desirous not to increase the price of gas. Last half year they paid 4 per cent.; and the result was that this had brought the shares down in value from £165 to £145, and they could not easily sell them at that price. He looked upon this as a great injustice on the part of the directors. While looking after the interests of the consumers, the directors should also take care of the interests of the shareholders. Doubtless they did this in most cases; but in the case he mentioned, their policy had had most disasterous results. Mr. Cox mentioned the fact of there not having been many new collieries opened in that district. He believed Mr. Cox was right. It had, however, recently come to his knowledge that a large colliery in his district, which never had sold their coal for gas purposes, were coming into the market with coal from a seam which had hitherto been considered a steam coal. They were opening out a new seam, and would put the produce, which would be of considerable amount, into the market as a gas coal. He also knew several other collieries where the same thing was being done; and so, although no new collieries were being started, coal was being put into the market to which they had not hitherto had access. He thought the matter that Mr. Woerth pointed out was a very desirable one to bring up. Mr. Woerth had had some considerable experience in this line; and personally he (Mr. Bower) had profited by his experience. He believed Mr. Woerth did not wish to bring in so much the saving of coal per horse power, as the advantage to be derived from working at a higher steam pressure. Many gas-works worked at a low pressure, of about 20 lbs. or thereby; whereas, if they were to work at an additional pressure, they would get corresponding benefits. There was nothing further, he thought, that he could say; and he would therefore only add that he was very glad indeed that the discussion they had had would place on record what was the experience of gas managers generally throughout the North of England.

The PRESIDENT said he was sure they were all very much indebted to Mr. Bower for bringing the subject forward. The discussion which it had evoked showed that it had been uppermost in all their minds; and he hoped much good would result from it.

Mr. Varley's Direct-Reading Photometer.—Mr. Ralph Richards has written to the *Electrical Review* in reference to the new photometer devised by Mr. F. H. Varley, which was described in the last number of the JOURNAL. He ventures to doubt that measurements may be conducted thereby with absolute mathematical accuracy. Errors which exist in the Bunsen photometer would, he believes, be found to occur, although possibly to a less extent, in this instrument, due to spectral disparity between two radiants, irregularity of luminous intensity of the standard, inability of the human eye to estimate exactly when the neutralizing action of the discs comes into play, and faulty adjustment of the mutual screen distance in regard to the two radiants. Slight external vibration or irregularity of rotation of the discs would, he says, tend to increase this error when the light to be measured has great luminosity compared with the standard, owing to the necessary disparity of slot-width in such cases.

SOUTH-WEST OF ENGLAND DISTRICT ASSOCIATION OF GAS MANAGERS.

The "Official Report" of the Proceedings.

(*Concluded from p.* 698.)

At the close of the discussion on the papers by Mr. S. Durkin and Mr. R. Beynon,

Mr. N. H. HUMPHRYS (Salisbury) read the following paper on

RECENT DESIGNS OF HYDRAULIC AND FOUL MAIN.

Having been disappointed at the last moment in the expectation of another paper to be read at this meeting, I have endeavoured to fill up the gap with the aid of some of my own experiences; preferring to take this course rather than leave room for an awkward pause at this stage of the proceedings. It also seemed a pity to leave our Association open to the reproach of not being able, from its roll of some 80 practical members, to evolve more than two who are able and willing to contribute their share towards filling the programme. No efforts on my part have been wanting in the way of endeavouring to arouse my fellow-members to a sense of their responsibilities. I have opened correspondence with a dozen or more, who up to the present have not contributed papers for these meetings. But they have one and all made excuse; and you will pardon me, no doubt, for taking this opportunity of asking those who are requested to aid in supplying papers for these meetings, to reply promptly, so that, in the event of a refusal, sufficient time may be left for application elsewhere. Some of our friends do not take it as a compliment to be asked, only about three weeks before the date of the meeting, to furnish a paper; and evidently think they are only resorted to after others have been tried and found wanting.

It was my original intention either to lay the matter which forms the subject of this paper before the Association at a later period, or to forward it for publication to the Editor of the JOURNAL OF GAS LIGHTING, when some chemical and other researches in connection with it have been completed. It may therefore be advisable to return to it on a future occasion. And I simply now recount the means adopted to secure particular results, without advancing any claim in the way of a new invention. It may be novel, or, on the other hand, other engineers may have been working on the same lines.

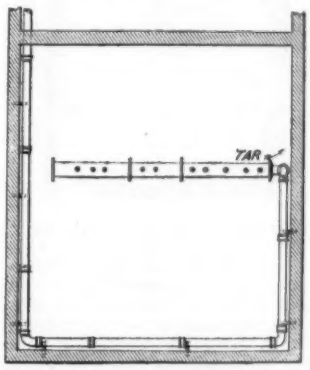
Among the questions that have been discussed at the meetings of Gas Managers' Associations, the desirablity of gradual condensation, and also that of maintaining the liquid contents of the hydraulic main in a thin fluid state, have received frequent attention. It is agreed that the condensation should be slow and gradual, without abrupt changes of temperature, so as to avoid the precipitation of hydrocarbons that might otherwise be carried along with the gas, and add to the illuminating power, and to administer a wholesome check to the vagaries of our erratic friend naphthalene. Also that the nearer the consistency of the condensed matters in the hydraulic approaches to that of water, the less will be the risk of undue pressure or oscillation in the seal, and the liquids will go along easily and quietly to their common destination in the tar-well. As a means of securing the first condition, the foul main carried round the inside of the retort-house is universally adopted; but no particular rule appears to prevail as to the dimensions of this apparatus, either in respect to diameter or length, as proportioned to the quantity of gas with which it is intended to deal. I am reminded of an old Christy Minstrel joke, which is to the effect that a nigger once entered a store and enquired the price of a pair of shoes. He was told they would be $3; whereupon the money was at once handed over with some show of consequence. After promising to call next day for the articles, he was affectedly mincing his way out of the shop, when the proprietor stopped him with: "Wait a minute, sir, we have not taken your measure." "Never mind the measure," replied the darkey; "make them as large as you can for the money." This anecdote seems to illustrate the practice with regard to the foul mains. Have them as large as you can for the money you can afford to lay out.

The obvious intention of the inventor of the foul main—he was a benefactor to his race, whoever he may have been—was that the pipe should be large enough to admit a slow rate of travel for the gas, and long enough to leave some appreciable time (perhaps two or three minutes) to be occupied by any particular particle of gas in travelling through from end to end. The speed at which the gas moves should be so slow that even the lightest particle of solid or vesicular matter should not be mechanically carried forward, but gravitate to its proper position at the bottom of the main. At the same time the temperature of the gas should fall to a moderate limit before the outlet is reached. Nothing further need be said about temperature; because, if the other conditions are met, this one will take care of itself. Let us take as an illustration a make of 144,000 cubic feet of gas per diem, which would mean about 100 cubic feet per minute; and we will assume that the rate of travel must not exceed 12 inches per second, and that the main must be large enough to hold two minutes' make of gas. The area, then, must be 2 square feet, and the length 120 feet. A wrought-iron pipe 19 inches in diameter would answer the purpose. This is given merely as an illustration, and not as a practical rule; for I find that these proportions may be exceeded with advantage, even when taking the maximum rate of make as the quantity to be provided for, in which case the gas, during the greater part of the year, travels through the foul main at a rate of only a few inches per second, and may occupy as much as ten minutes in passing from end to end.

Let us now turn to the second consideration—that of maintaining a thin liquid state in the hydraulic main, and, further, a layer of water floating on the top of the tarry matter. Managers of large works may take their choice of a variety of special devices which have been introduced for this purpose. Where the ordinary hydraulic only is used with plain overflow, it is a common practice to facilitate matters by flushing out the main with ammoniacal liquor. One gentleman has suggested tar; while others have considerable faith in the powers of steam. The Somersetshire coal, which is chiefly used in our district, yields a tar that is not only apt to be thick, but clotty; and some of these clots are so firm as to make one fancy they must have a foundation of a piece of waste, or some solid accidentally introduced into the main. The tar from some of our Somerset coals, worked at a good heat, will surely test the powers of any tar separator.

In small works, such as are under the control of one workman during the greater part of the year, simplicity and the least possible liability to stoppage is a prime necessity. I know, from experience, the difference between having to tackle a stoppage at a small country works, with no steam and only one or two labourers, and meeting the same difficulty at a moderate-sized works, with plenty of steam and half-a-dozen practical men within reach. And it occurred to me that a foul main of ample capacity, taken off from one end of the hydraulic, and laid with a decided fall towards the inlet, in such a manner that the whole of the condensed matter would flow back against the current of gas, and return to the hydraulic, would be a good thing. The thinner tar deposited near the outlet end of the foul main would mix with the thicker matter in the hydraulic; and the water, which is deposited in a foul main of ample size in considerable quantity, would help to maintain a water-seal as against a tar-seal. The pitchy matter, being thinned and diluted, would flow off more readily; and the more rapid stream through the hydraulic overflow or bridge-valve would create a gentle but continual flushing action, and keep the pipes clear right away to the tar-well. Such an arrangement is not intended for large works having several different sections of hydraulic main, but for small sets of three or four beds, with one hydraulic common to them all. It possesses the advantage of removing the liquids at the highest possible temperature, and with a minimum degree of contact between the tar and the gas at a low temperature, which is known to be objectionable.

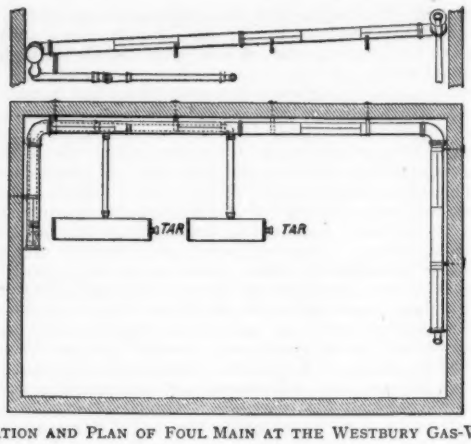
The first opportunity for putting these views into practical shape occurred when I was constructing new gas-works for the Wilton Corporation about two years ago. The extensions included a new retort-house, with a bench of three beds of retorts —two, three, and five respectively—and a hydraulic main about 22 feet long serving the whole. The foul main consists of about 90 feet of 8-inch cast-iron pipe, having a fall right back into the hydraulic. The overflow from the latter was intended to be placed at the opposite end; but this could not be done,



PLAN OF FOUL MAIN AT THE WILTON GAS-WORKS.

and so it was put on as near the end as possible. This main has a sectional area of 50 square inches, and a capacity of 32 cubic feet. The maximum production is 1000 cubic feet of gas per hour, at which rate the gas would travel at the speed of 9 inches per second, and occupy two minutes in traversing the pipes. This arrangement is a decided success. It removes the greater part of the tar and liquor, the whole of which reaches the tar-well in a thin fluid state. The yield of gas is high; and the quality 17 to 19 candles. It should be added that very favourable circumstances exist here, as the whole of the plant is new, and an exhauster is used.

The next example was designed for and erected at the Westbury Gas-Works, in place of a short connection leading from the hydraulic main to the condensers. It consists of about 66 feet of 14-inch wrought-iron pipe. There are two lengths of hydraulic, one of which serves for eight, the other for three retorts. A 6-inch connection from each joins into an 8-inch pipe connected to the inlet of the foul main. Each connection is

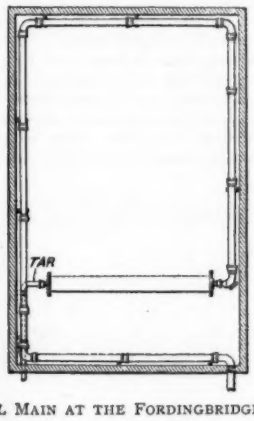


ELEVATION AND PLAN OF FOUL MAIN AT THE WESTBURY GAS-WORKS.

provided with a valve; and the valves are set on the same level, so that the liquid flowing back from the foul main passes through either valve that may happen to be open. This foul main is intended to deal with a maximum of 2000 cubic feet per hour. The capacity is just over 70 cubic feet; so the gas occupies a little more than two minutes in passing through, and has a velocity of 12 inches per second.

At these works the outlets from the various seal-boxes are led into one general catch-pit; so the quantity of fluid running from each part of the plant can be readily observed. Before this foul main was put up, thick tar with a little water could be seen coming from the outlet of the hydraulic, and about a similar quantity of thinner and more watery tar from the condensers. Since starting the foul main, practically the whole of the fluid returns through the hydraulic main. The thin tar mixes with the thick, and the water goes to help in making a water-seal on the top of the tar. This takes place with a make of about 1000 cubic of gas per hour, or half the quantity above named; and it is interesting as showing that a travel of 6 inches per second through a foul main 70 feet long is sufficient to secure the deposition of practically the whole of the liquids from the gas.

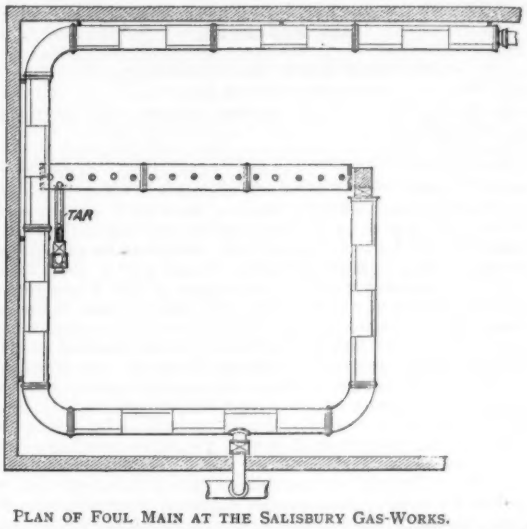
My third example is a foul main designed for the gas-works at Fordingbridge, which are about the same size as those at Wilton, and have a maximum make of about 1000 cubic feet



PLAN OF FOUL MAIN AT THE FORDINGBRIDGE GAS-WORKS.

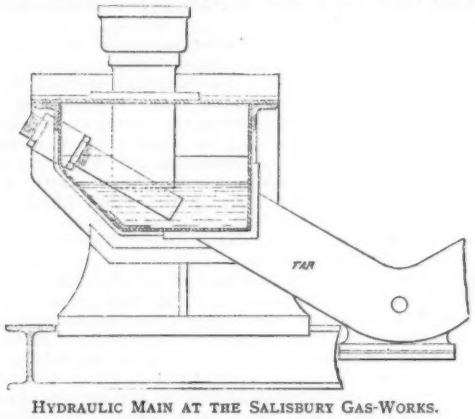
per hour. Here I have been able to put in about 110 feet of 8-inch pipe, in place of the 90 feet as at Wilton; and thus the capacity of the foul main, and the time occupied by the gas in passing through, are increased to a proportionate extent.

We now come to a design in course of erection at Salisbury, where there is a great scarcity of retort-house room; and consequently a bench of three beds of fives is to be put up in a building hitherto used as a coal-store. In connection with this setting, there will be a foul main 24 inches in diameter and 130 feet long—representing some 400 cubic feet capacity; but it is not intended exclusively for the bench, as a connection will be made to enable the gas from the old retort-house to pass through it. Like the foregoing, it has a direct fall back to one end of the hydraulic main, of which there is one length common to the three beds. I purposely have one length, not caring for separate sections to each bed. This hydraulic is of wrought iron, made in rectangular section, with one of the bottom angles cut off. The outlet to the foul main is at one end, and at the other the tar outlet, which comprises a shallow U-syphon, bridge-valve and seal-box, so designed that every part can be cleaned or scraped out, without interfering with the make of gas. The two limbs of the syphon are connected by a short piece of wrought-iron pipe fitted with a cock. This is necessary to prevent any accidental slowing or stopping of the exhauster from causing a lowering of the level of the liquid in the main. If the cock is closed, and the



PLAN OF FOUL MAIN AT THE SALISBURY GAS-WORKS.

exhauster intentionally run slowly, a back pressure of 6 inches will drive out the whole contents of the hydraulic main. It can be filled up again with liquor, for which purpose a pipe will be



HYDRAULIC MAIN AT THE SALISBURY GAS-WORKS.

connected to it. This arrangement draws off the heaviest part of the liquid first, from the lowest point in the main, and may be used as a flushing apparatus as often as required.

Discussion.

The PRESIDENT said they had heard an interesting paper. The foul main was so arranged as to bring all the liquid back through the hydraulic; and he looked upon that as a great feature, as the thinner tar would help the thicker away. As a tar buyer, he knew that the hydraulic main tar by itself was of little value to him. Scrubber tar contained more naphtha, and was worth three or four times as much. The slow rate of passage during condensation would relieve the scrubber; and there would thus be little or no scrubber tar. Respecting his own hydraulic mains, he had altered the overflow by closing up the lower passage into the tar-box; and he added a syphon arrangement which would draw off the thick tar from the bottom of the hydraulic.

Mr. S. W. DURKIN (Southampton) said, in reference to laying the foul main with a fall right back into the hydraulic, that his experience was of an opposite character. But this was with a horizontal pipe condenser, in which the liquids flowed in a contrary direction to the current of gas. The pipes were continually getting choked. His condenser, however, was situated out of doors; and therefore was not strictly comparable with a foul main carried round the inside of the retort-house. He was speaking of gas made from North Country coal, and possibly the effect might be different with another kind of coal; but he would not advise anyone to lay a pipe outside in this way.

Mr. H. SAINSBURY (Trowbridge) said that the arrangement proposed in the paper was quite new to him, as at his works the foul main was so laid that the liquids flowed in the same direction as the gas. He quite perceived the advantage claimed, and believed that it would aid considerably in keeping the tar in solution.

Mr. R. BEYNON (Torquay) said he was struck very much by the proposal to let the liquids flow against the gas; for he had read in the JOURNAL OF GAS LIGHTING of more than one example where such a plan had led to trouble from stoppages. He hada large foul main round the inside of the retort-house; but in his case, it would not be practicable to bring the gas and tar to run in opposite directions throughout. There were three separate benches in the retort-house, and a separate section of hydraulic to each bed.

Mr. T. W. R. White (Sherborne) thought that, in discussing matters of this sort, each speaker should state plainly his own opinion or experience. He liked a separate section of hydraulic for each bed of retorts. His hydraulic was continuous, but divided into as many compartments as there were beds, by plates of sheet iron. Each division had a separate 6-inch branch at the back, with a bridge-valve, and led to a 12-inch collecting-main running parallel with the hydraulic. The collecting-main led to a very large foul main, 30 inches in diameter. There was a great advantage in the slow rate of travel; and though he could not give speeds and all that kind of thing, he knew there was a permanent increase in the illuminating power of the gas. He therefore recommended everyone to have a good sized foul main. He took exception to the claim of some advantage by running the liquids back through the hydraulic, as he liked to be able to shut off all the retorts not in use.

Mr. D. Irving (Bristol) said that the foul mains described in the paper had been constructed according to principle; and that rules and illustrations had been laid down for the guidance of gas engineers. But he thought there was too much principle; for according to the rule stated, his foul main at Stapleton ought to be about 60 inches in diameter. At the same time he did not advocate a small foul main; and one could scarcely err in having it too large. He believed in keeping the hydraulic main at a high temperature, and in periodically flushing it out. Not only was the pressure given by the seal reduced, and the removal of tarry particles facilitated, but there was also a great advantage in the way of removing ammonia. He agreed with the previous speaker as to the desirability of separate sections of hydraulic to each bed. He had recently patented a combined bridge-valve and flushing apparatus; and it was in successful operation at Stapleton. The fluids were always run off from the bottom of the main; and there was an upper and a lower port, with a valve which was always covering one or the other. By raising the valve so that it covered the upper part, the gas-way was closed, creating a pressure which forced the contents of the main out through the lower port. In this way, the hydraulic could be emptied as often as desired; and without interfering with the make of gas. There was a lever by which the valve was held in position, and which could be secured by a lock, if desired.

Mr. Humphrys, in reply, said he was gratified at the reception accorded to his paper; for it appeared that those gentlemen who differed from him had really misunderstood the drift of his remarks. By referring to his paper, it would be seen that the drawings before the meeting illustrated arrangements in which special proportions had been adopted for special requirements, and that they were not put forward as representing general principles for the guidance of gas engineers. Mr. White objected that the plan described necessitated the whole of the hydraulic being left open to the exhauster; but it was mentioned in the paper that the arrangement was only intended for dealing with one or at most two sections of hydraulic, and at least one of these must be open, in order to maintain the make of gas. Mr. Irving had attempted to show, by a sort of *reductio ad absurdum* argument, that the size of foul main adopted must be unnecessarily large. This did not follow; for if he would take the size of the purifiers, or indeed that of almost any part of the apparatus at the small works named in the paper, and calculate them out according to the proportionate make at Stapleton, he would have the satisfaction of arriving at equally astounding results. With regard to the risk of choking, he laid his pipes with a greater fall than usual; so that the rate of flow of liquid through them was moderately brisk. One of the arrangements illustrated had been in continuous operation for nearly two years, and no trouble had been experienced.

Votes of Thanks.

The President said he had great pleasure in proposing a vote of thanks to those gentlemen who had assisted in the proceedings by reading papers, exhibiting models, &c. He considered they had made up a most interesting programme.

Mr. T. Hardick (Salisbury) thought he was the proper person to second this vote of thanks; for he claimed some share of the credit of inducing Mr. Humphrys to read the paper they had just heard. Their Honorary Secretary was hard-pressed for matter to fill the programme; and he had pressed him still further. He was also pleased to second the vote, because, in in his opinion, they had just held a good practical meeting; and the discussions had elicited remarks and opinions which would be of much value to all.

The resolution having been carried with applause,

Mr. Durkin thanked the meeting for his kind reception, saying that the little he had contributed, had been done with great pleasure.

Mr. Beynon also briefly responded.

Mr. White proposed a hearty vote of thanks to the President for his services during the year, which had included two good, successful meetings. He hoped the members would always support the President in every possible way. If any members were inclined to complain of the occasional thinness of their programme, he would remind them that the fault lay at their own doors; for it was their Association, and would be just what the members chose to make it.

Mr. Sainsbury seconded the proposition, which was carried with applause.

The President said he received the vote with much pleasure. He had accepted the office with a great deal of foreboding; but he hoped he had done his duty. At any rate he had endeavoured to do so to the best of his ability. He was sure they had held a pleasant meeting at Bristol; and he took the opportunity of conveying through the Secretary of the Gas Company (Mr. J. V. Green) the thanks of the Association for the privilege they had received of visiting the Stapleton Road works.

Mr. Green said he was much gratified at the kind reception extended to him, and was pleased to be present, and to see the Association in Bristol.

Mr. Durkin proposed a vote of thanks to the Honorary Secretary and Treasurer; saying he was glad that he had been elected again, and had consented to accept office.

Mr. Hardick seconded the proposition; remarking that he believed the Association would never have a better Secretary, or one which took more pains with its affairs. He really felt that their Secretary wanted more support from the members than some of them afforded him. It did not sound well to hear that more than £40 was due to the Association for subscriptions.

The proposition was carried with applause.

Mr. Humphrys remarked that he was much gratified at the kindly feeling accorded to him. The Association included so many personal friends of his that it was a great pleasure to him to do his best. He heartily approved of the expression "our Association" used by Mr. White; for every member ought to be willing to support and take his part in its affairs in every possible way. It was not well that there should be too much of the personal element in the management of its affairs, or that they should centre round a few individuals only.

At the close of the meeting, the members and friends dined together at the Royal Hotel.

The Electric Light in Siam.—A Siamese electric light company was formed last year in Bangkok; and a contract was made with the Brush Company to supply engineers and material for the establishment of a system of electric lighting in the city within a radius of five miles from the central station in Bangkok. There being no supply of gas, except on the road in front of the Royal Palace, and the thoroughfares being but dimly lighted with oil-lamps, the employment of electricity in illuminating the public roads and buildings will, no doubt, says *Industries*, place Bangkok in a position superior to that of many Oriental cities. The owners of large rice and saw mills, too, many of whom keep their mills working day and night, would perhaps find the use of the electric light on the mill premises desirable from an economical point of view, apart from the consideration of increased illuminating power. Our contemporary thinks it would be difficult at the present time to determine how far the incandescent lamps would find favour in private houses, as kerosene oil will not easily be superseded.

Belgian Association of Gas Managers.—According to the report of the proceedings at the last meeting of this Association, the past year's work has been of a very satisfactory character. On that occasion the President (M. Masjon, Superintendent of the Forest works of the Imperial Continental Gas Association) reported that the Society had in the savings bank a sum of 5657 frs., and that the number of members on the roll was 114, five of whom had just been admitted. The Vice-President (M. Pettré) gave an interesting account of the labours of the Committee who have the control of the permanent exhibition of gas appliances which the Association have instituted in Brussels, and which is supported in a large measure by funds supplied by the Municipality in conjunction with various gas companies and manufacturers of gas appliances. In the twelve months covered by the report, the Committee received 19,690 frs. from these sources (including a sum of 2000 frs from the funds of the Association), as compared with 18,750 frs. in the year 1888-9; the total amount for disposal being 23,033 frs. Of this about 20,000 frs. were spent in carrying on the work of the exhibition. The number of exhibitors in 1888-9 was 40, and they had on view 353 gas lighting, heating, and cooking appliances of all kinds; in the past year it was 53, with 375 appliances. The number of visitors rose last year to 70,800, as compared with 58,760 in 1888-9. These figures do not include the persons who attended the lectures and classes on practical cookery held by the Association. The visitors select the appliance they prefer, and the order is transmitted to the maker or his agent. The sales numbered 764, against 423 in 1888-9. The Committee acknowledged the valuable assistance they had received from M. Richard, a gas chemist of Brussels, who delivered lectures on the various uses of gas and coke; and also those of M. Garde, who gave weekly lessons in cookery, in the course of which he demonstrated the superiority of gas as the fuel to be employed in culinary operations. These lessons were all well attended by ladies. Coming to the technical business of the meeting, it consisted of descriptions by M. Bandsept of his high-power "gaso-multiplex" lamps and his appliances for effecting the inversion of induced air currents in gas-burners.

THE LIGHTING, HEATING, AND VENTILATION OF PUBLIC LIBRARIES AND READING-ROOMS.

At the Thirteenth Annual Meeting of the Library Association of the United Kingdom, held last month at Reading, Mr. W. H. Greenhough, F. R. Hist. Soc., the Librarian of the Free Public Library in that town, read a paper on the above subject, of which the following are the principal portions.

One of the greatest difficulties, perhaps, with which public library authorities have often to contend is that relating to the defective ventilation of their libraries and reading-rooms, frequently owing, no doubt, to proper want of thought or oversight on the part of the architect, whose duty it is usually to make suitable provision for the necessities of ventilation.

The question of ventilation does not certainly appear, as a rule, to receive anything like the consideration due to its importance, when buildings are about to be erected for public library purposes. As an instance of this, an architect, under whose superintendence a certain library had been built, stated that he did not consider free libraries required much ventilating, as the people generally using such institutions rarely opened the windows of their houses. Doubtless this absurd expression was used as an excuse for not having provided the proper means for the ventilation of this particular library. The public librarian of to-day knows that, as the free library is maintained by the public at large, so is it also used and appreciated by all classes of the community. Surely, then, in an institution, one of the primary objects of which is education, filled day by day with large numbers of people, perusing the stores of information and knowledge provided for their mental use, it is most necessary that the air to be inhaled should be as pure and wholesome as can be obtained, and not oppressive and loathsome, as is too often the case.

Dr. Parkes, in his "Manual of Hygiene," says 3000 cubic feet of fresh air should be provided for a mixed community of people per head per hour; and this standard is accepted by most modern sanitarians. This amount, however, should be largely increased where gas is used for lighting purposes, if the products of combustion are allowed to pass into the air of respiration, as is generally the case. Wolpert states that, for every cubic foot of gas burned, 1800 cubic feet of fresh air should be supplied, in order to properly dilute the products of combustion; and Dr. Parkes remarks that this quantity does not appear too much, seeing that a cubic foot of gas produces about 3 cubic feet of carbon dioxide, and that sulphur dioxide and other substances may also be found. A common gas-burner is said to burn about 3 cubic feet of gas per hour, and to consume 10 or 12 feet in an evening of four hours; so that from 18,000 to 21,000 cubic feet of fresh air ought to be introduced for one gas-jet alone during the four hours.

Carbonic acid gas is usually considered as an index of the sanitary condition of the air of respiration, from the fact that the percentage of organic impurities increases with the rise in quantity of carbonic acid. Dangerous impurities appear generally to be found in the company of carbonic acid gas. Professor Ewing states, in his article on "Ventilation," in the last edition of the "Encyclopædia Britannica," that carbonic acid is not the only test of vitiation, nor the most injurious impurity. Another criterion of the foulness of close air is the amount of oxidizable organic matter it contains; and another and most valuable one is the number of micro-organisms, especially of bacteria. An habitually close room acts, indeed, as a nursery of micro-organisms, which a casual flushing with fresh air will not properly purify; the bad effects of a foul stagnant atmosphere being cumulative.

According to Pettenkofer and Parkes (*vide* the "Manual of Hygiene"), a mixed community of people evolve on the average 0·6 of a cubic foot of carbonic acid per head per hour; and when the gas is not more than 1·5 to 3 volumes per 1000, headache and vertigo are produced. The smell of organic matter is usually perceptible in a room vitiated by respiration when the carbonic acid amounts to 0·7 per 1000. Organic matter is, however, rendered much stronger to the smell by the humidity of the air than by a rise in temperature; the effect of an increase of 1 per cent. in the humidity being equal to a rise of fully 4° Fahr. in temperature. Dr. de Chaumont states that many of the impurities in the air are not perceptible to the smell at all.

The experiences and researches of various sanitarians point conclusively to the fact that breathing the vitiated air of respiration has an injurious effect upon health. Dr. Parkes, in his work already mentioned, remarks, indeed, that statistical inquiries on mortality prove beyond doubt that, of the causes of death which are usually in action, impurity of the air is the most important.

When we come to examine the various methods by which good ventilation may be obtained, we find that they are not only most numerous, but also most diverse in character. The chief difficulty in the way of procuring satisfactory ventilation seems to be one of cost. So-called natural ventilation can be acquired at comparatively little expense; and if the financial question is not allowed to interfere with the matter, ample ventilation may be provided, during all seasons, by artificial means. Artificial or forced ventilation usually signifies the employment of machinery, in order to move fans or blowers, or other complicated and expensive methods, the consideration of which is, perhaps, somewhat beyond the scope of this paper.

Ventilation is usually divided into two distinct systems, the one is termed the upward, and the other the downward plan. In the former mode the currents of fresh air pass from below upward; and in the latter, the fresh air proceeds downward. A valuable report upon these two systems was made a few years ago to the House of Representatives at Washington, by Professor Henry, of the Smithsonian Institution, and other competent persons. From this document (which has been reproduced in Billings's "Principles of Ventilation and Heating"), it appears that the upward system is best adapted for large reading-rooms, where many of the conditions tend to assist this form of ventilation.

Of the various arrangements by which fresh air may be introduced into libraries and reading-rooms one of the most useful is that due to Mr. Tobin, of Leeds, and generally known under the name of Tobin's tubes. These tubes should be carried as a vertical shaft from the floor to about 6 or 7 feet; but the depth and width may vary to suit any position in which they may be placed. A decided advantage in this method is that the inlets may be fixed in many situations most difficult to reach by other means; and it is certainly most important that inlets should be properly apportioned about the building, in order that an adequate distribution of fresh air may be assured. An excellent way to place the tubes in a reading-room is, when practicable, in a continuous length round the room, against the wall, and with a projection of about 2 inches; thus forming a kind of dado. An advantage is gained by placing the tubes against an outer wall, as by so doing the fresh air may be brought directly into the tubes, through an opening in the wall. When the tubes are placed in other positions, the air must be carried under the floor, or introduced into the tubes in some other indirect manner. The tops of the Tobin tubes should, of course, be provided with lids or valves to regulate the amount of fresh air to be admitted. The Sherington valve is a most useful kind of inlet; but it ought to be placed in an outer wall. In this simple plan the fresh air passes through a perforated iron plate or brick, and is then directed upwards by a valve, which can be closed when necessary by a balanced weight. The Wenham Company have recently brought out a form of inlet, which acts somewhat in the same manner as the Sherington valve, and is considered an improvement upon it. This "louvre ventilator," as it is termed, is an admirable method by which fresh air may be introduced into rooms; but, like the Sherington, it should be fixed in an outer wall to be of much practical use for public library purposes. A fairly good arrangement of inlets might be provided for an ordinary library and reading room by a proper supply of Tobin tubes and Sherington valves or louvre ventilators, in suitable proportions of each. Professor Trowbridge, in an article in the *Sanitary Engineer*, advocates the use of steam, or even hot-water pipes, as a means of assisting natural ventilation, by placing the pipes at the basis of ventilating flues, in order to produce a draught. Steam-pipes appear to have been successfully used for this purpose in the library buildings of Columbia College, New York. The experiments of Mr. Tobin led him to the conclusion that, if proper inlets are provided for the admittance of fresh air, the outlets for the vitiated air may generally be left to take care of themselves. Although this judgment may be somewhat correct, it must not be forgotten that, under usual conditions, a really good supply of inlets is not always easy to provide, especially after a building has been erected. It is, however, certain that ample provision should be made for inlets, and recourse not made necessary to open windows and doors, whereby draughts are caused, to the discomfort, if nothing worse, of the readers in our libraries.

Outlets for the vitiated air are generally fixed very high; the ceiling being considered an excellent position in which to place them. When gas is used for lighting purposes, and is consumed openly in the air, it should, when practicable, be burned directly under the outlets, so that not only the products of combustion may be carried away at once, but also that the heat may be utilized in making the outlets more effectual. When the vitiated air cannot be taken immediately into the outer atmosphere, it should be done by means of pipes or tubes, and a cowl of some description ought to be fixed to the external outlet, to prevent down-draughts, even if it will not assist the ventilation. According to the researches of the Committee of the Sanitary Institute of Great Britain on the various sorts of cowls, the best form is that of the common lobster back. When outlets fail to act properly, a fan or archimedean screw, for the purpose of extracting the vitiated air, may sometimes be substituted for the cowl with good results; but during the summer days, when there is little or no movement of the outer air, fans or screws to be of any practical value should be driven by machinery.

[The author next dealt in detail with the four methods usually in vogue for heating or warming libraries and reading-rooms—hot-water pipes, steam pipes, hot-air furnaces, and fire grates or stoves.]

In considering the provisions to be made for artificial lighting, it must not be forgotten that, although it is necessary that the illumination should be ample, lest the eyes be strained, and perhaps even injured by reading in a deficient light, it is also important that the light should not be too strong. Dr. Forbes Winslow, in Babbitt's "Principles of Light and Colour," states that persons exposed for an undue length of time to the glare

of brilliantly-lighted rooms often suffer from chronic ophthalmia and other affections of the organ of vision; that literary men, from the same cause—in fact, all who work by artificial light—are subject to disorders of the eye.

The general system in vogue for artificial lighting is, of course, by means of coal gas; and where methods are adopted which do not permit the products of combustion to pass into the air of respiration, gas as an illuminant is not objectionable to the same extent as when utilized in the usual manner. That impure additions are made to the air by the ordinary form of gas lighting is well known. Dr. Parkes, indeed, says the large quantity of gas often burned not only causes great heat, but humidity of the air, sulphur dioxide, an excess of carbon dioxide, and a little carbon monoxide, to which some of the bad effects produced may be due. From Watts's "Dictionary of Chemistry," we learn that oxygen constitutes one-fourth of the atmosphere; and that, independently of its existence in the water of the tissues, it is an essential of all living organisms. Yet Dr. Parkes states that a cubic foot of coal gas, by the ordinary methods of lighting, destroys, during combustion, the entire oxygen of about 8 cubic feet of air, in addition to raising the temperature of 31·290 cubic feet of air by 1° Fahr. Coal gas, as generally burned, has a very damaging effect upon the painted work of walls and ceilings. It is also well known to have most destructive effects upon the leather bindings of books. In the Public Library at Reading, the leather edging of the book-shelves was so attacked by the products of gas consumed for lighting purposes that, after the edging had been in use some seven years, the small portion which had not already fallen to the floor from literal rottenness had to be entirely removed.

The evils arising from coal gas as ordinarily burned clearly indicate that, whenever it is the source of illumination in libraries and reading-rooms, it should most certainly not be consumed in the air of respiration, but some plan ought to be adopted by which the noxious gases of combustion are carried directly away. There are now in operation several methods by which this end is accomplished—notably the Wenham ventilating lamp, and the ventilating lamps of Messrs. Sugg and Co. These regenerative gas-lamps possess several admirable features which render them most suitable for use in libraries and reading-rooms. The advantages claimed for the Wenham are: Immense economy in consumption of gas; intensity, purity, and steadiness of the light; absence of downward shadow; practical completeness of combustion; amount of radiant heat hardly perceptible 5 feet below the burner; and—most important of all—the lamp, acting as a ventilating light, not only removes the vitiated air of the room, but also at once carries away the gas fumes. That the Wenham lamp is considered a most secure method against fire, as compared with the ordinary plan of gas lighting, is proved by the fact that the Fire Insurance Companies' Association at Adelaide are reported to have reduced the rates of insurance from 20s. when ordinary gas-burners are used, to 12s. 6d. when the Wenham is adopted.

(*To be continued.*)

Sulphur Compounds in Raw Petroleum and Petroleum Residues.—It has been already pointed out in the JOURNAL that some varieties of petroleum contain considerable quantities of sulphur compounds, which mostly have high boiling points, and are present in largest proportion in those fractions of the oil which boil between 200° and 300° C. These compounds can be extracted from petroleum oil by the following process, which is recommended by Mabery and Smith in the *Berichte der Deutschen Chemischen Gesselschaft*, and is quoted in the *Chemical Trade Journal*. The oil is first treated with concentrated sulphuric acid; the acid solution is then diluted and neutralized, either with carbonate of lead or chalk. On evaporating down, a salt gradually separates from the solution. This salt is collected and washed, after which it is subjected to distillation with steam, which causes the sulphur compounds to pass over into the receiver, where they collect in the form of a pale yellow oil, containing 14·97 per cent. of sulphur. The compounds can be separated from each other by fractional distillation.

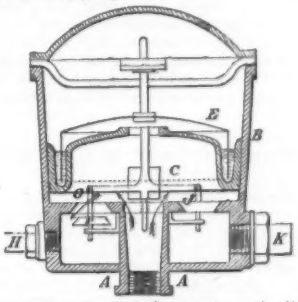
The Mannesmann Process of Tube Manufacture.—Last Wednesday, a number of gentlemen, representing the Admiralty, the War Office, the Board of Trade, and other public bodies, went to Swansea by special train for the purpose of seeing the extensive works which the Messrs. Mannesmann and Messrs. Siemens, of Berlin, with some other gentlemen, have established at Landore, for the purpose of making weldless steel tubes direct from solid bars of steel by a process which was fully described in the JOURNAL for June 3 last (p. 1028). The party were received by the Messrs. Mannesmann, who conducted them round the works—showing them the tube-mills and the process of rolling tubes of different sizes, thicknesses, and strength; while tests of strength and quality were made with results which greatly surprised the experts who witnessed them. The Mannesmann system is especially adapted for the production of pipes for the conveyance of water, gas, and air at high pressure; and the opinion generally expressed was that the quality of the steel was greatly improved by the treatment it received—the resulting tubes showing firmness and strength impossible of attainment by other methods of manufacture. The tests were continued on the following day, when the visitors returned to London.

REGISTER OF PATENTS.

Distributing Heating and Lighting Gas.—Thwaite, B. H., of Liverpool. No. 12,054; July 30, 1889. [8d.]

This invention relates to a method of distributing heating and lighting gas, whereby heating gas can be distributed in the same mains in the daytime and lighting gas at night, and in such a way that the less costly heating gas can be utilized by the consumer without his having to pay for the more costly or lighting gas, and the consumer is also prevented from using the lighting gas without the consumption of it being indicated as lighting gas.

To effect this, two separate meters are provided—one only allowing the gas to flow through it at a pressure of (say) from about 3 to 10 inches or more of water, or at a pressure above the maximum pressure limit of the lighting and more costly gas; the other meter being the ordinary meter employed for registering the more expensive and lighting gas, and allowing it to flow through at the ordinary pressure. The high-pressure or heating-gas meter is fitted with an internal governor arrangement, or with a mercury seal, that will only allow the gas to enter the meter when the pressure mentioned has been established; the governor being placed in such a way as not to be tampered with by the consumer. It is proposed to fill the gas-distributing mains in the daytime with a preferably slightly luminous heating gas—of (say) 8-candle power—at such a pressure as shall ensure the gas passing through the high-pressure meter; and the consumer will, for his own interest sake, see that the heating gas passes through this meter, because were it to flow through the low-pressure meter, he would be charged for the more costly lighting gas. An electric, pneumatic, hydraulic, mechanical, or mercurial device automatically distributes the heating and lighting character of gas to their respective meters; so that when the heating and high-pressure gas is turned on to the mains, the valve or cock leading the gas into the low-pressure meter will be closed, and when the low-pressure gas is on, the same device will automatically open the cock on the pipe leading to the low-pressure meter, and allow the gas to continue to flow to the place of use. During the time that the mains are being filled with lighting gas, and displacing the heating gas, the pressure is so gradually reduced as to enable the consumer to open the cock on the pipe leading to the low-pressure or lighting-gas meter, so that the supply will be maintained; but by the use of an automatic device, to be presently described, the heating and lighting gas is delivered automatically to the respective meters, from which the gas is distributed for heating or for lighting purposes.



Between the two meters is placed an automatic distributing device, as shown in the engraving, by which the gas according to the pressure and quality is distributed to one or the other meter. The gas from the street main enters by the supply-pipe A and the distributor B. Assuming it is the ordinary low-pressure lighting gas, this gas enters into the chamber C of the distributor; and as the gas is too low in pressure to lift the bell E, the valve F is kept open. This uncloses the opening G, and the gas escapes through the pipe H, and enters the meter, which registers the low-pressure gas. When the high-pressure heating gas is turned on to the mains, the gas flows into the distributor B by the pipe A, and enters the chamber C; its pressure lifting the bell D, closing the opening G, and lifting the valve S. Opening the outlet J, the high-pressure gas then flows into the pipe K, and passes through the meter to the right (when its volume is recorded) to the heating apparatus.

Gas-Burners for Cooking and Heating Purposes.—Leoni, S., and Sinclair, J., Cannon Street, E.C. No. 15,225; Sept. 27, 1889. [8d.]

The object of this invention is to construct gas-burners for stoves in such way as to enable the whole or any of them to be removed without the use of tools. This is attained by forming iron or other metal supports of various shape, on which the burners rest, but which are left free and independent of all fittings and fixtures, so that they can be removed or replaced without difficulty. The invention further consists in constructing separate straight longitudinal burners, provided with flanges or wings (forming one inseparable body), which rest or move on supports or slides fixed underneath the hot-plate of a kitchener, or inside the roof of a grilling-stove. The flanges or wings between the burners joining together form a heat deflector above the gas-jets, which issue from the body of the burner immediately below the wings; and the heat generated therefrom is radiated from the surface of the wings on to the viands below—openings being provided to ensure complete combustion.

Gas-Washers.—Saville, G. E., of Todmorden. No. 15,740; Oct. 8, 1889. [8d.]

The object of this invention is, in addition to the ordinary process of purifying gas by washing, to regulate the flow of gas to the exhauster, whereby excessive external pressure, and the consequent ingress of atmospheric air or furnace gas into the washing apparatus are avoided.

The arrangement of the apparatus was fully described in the paper

read by the patentee at the last quarterly meeting of the Manchester District Institution of Gas Engineers. The JOURNAL for the 2nd ult. contained this paper and illustrations similar in every respect to those accompanying the specification of the patent.

The claims for the invention are: (1) In gas-washing apparatus, the combination of the washing-tank and inverted trough for washing the gas with the regulator, in which a funnel screwed to an outlet-pipe and adjustable thereon, controls the working lever of the liquor in the washing-tank, and prevents excessive draught from the exhaust. (2) The devices for regulating the flow and pressure of gas being operated upon, by increasing or decreasing the dip or seal of the plates of the inverted trough or bell, by means of a liquor-level regulator. (3) In a regulator appertaining to a gas-washer, an overflow receiving funnel, with screw adjustment, for the purpose of regulating the working level of liquor in the regulator and washing-tank. (4) The general arrangement and relative positions of the various parts of the combined gas-washer and regulator as represented.

Obtaining Salts of Thorium, Zirconium, and like Metals from their Ores or from Waste Residues of Hoods used for Incandescent Gas Lighting.—Imray, O.; communicated from W. MacKean, of Paris. No. 16,555; Oct. 19, 1889. [6d.]

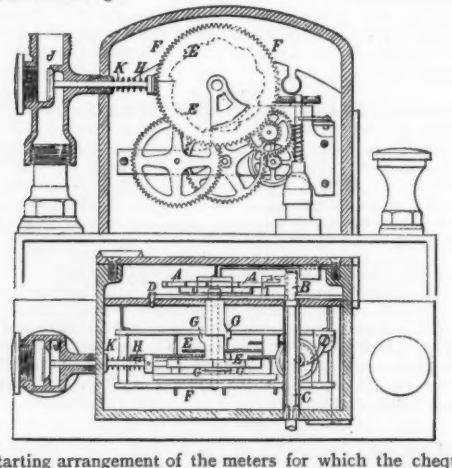
This invention relates to a process for obtaining salts of thorium and zirconium and like metals from their ores or from waste residues of hoods used for incandescent gas lighting in a state of purity suitable for incandescent gas lighting and such like purposes. This may either be done by treating with hydrochloric acid, separating the impurities, precipitating as hyposulphite, and dissolving the same in acid; or else by fusing with an alkaline hydrate, dissolving in acid, separating the impurities, precipitating as hyposulphite, and dissolving the same in acid, as before. The specification also describes a process for obtaining, from waste residues of incandesence hoods, the salts of the metals contained therein, by dissolving in acid, separating impurities, precipitating as hydro-oxides, dissolving in hydrochloric acid to obtain the chlorides, and treating these for separation of the different metals.

Carburation of Air.—Fritz, A. A., of Brussels. No. 17,140; Oct. 29, 1889. [1s. 1d.]

This invention consists, in addition to numerous improvements in the construction of apparatus for distilling petroleum and similar liquids, as also for the purification of the carburetted air by filtration and condensation, of special means for effecting the carburation of the air, which consist in the combination, with the generators of vapour, of various constructions of injectors of the "Gifford" or other suitable systems, wherein the carburating vapours constitute the vehicle which carries with it the carburetted air into the holder. This combination of injectors with the generators is effected in various ways, which are described in six pages of letterpress, illustrated by nine sheets of drawings.

Prepayment Gas-Meters.—Bickerton, H. N., of Ashton-under-Lyne. No. 17,461; Nov. 4, 1889. [8d.]

This invention, relating to prepayment meters for the supply of gas or other fluids, has for its objects the construction of such meters so as to give greater security against fraud than those at present in use. Hitherto, says the patentee, this class of meters has been constructed so that, when the supply of gas is stopped after the quantity paid for has been supplied, there is required either the attention of a company's official to start the meter, or they have been constructed to automatically re-start themselves by the introduction of a coin of the value of the gas to be supplied. The repeated attention of an official for such purpose is often inconvenient; and then it is easy to find substitutes for coins. To remedy these evils the inventor proposes to employ cheques or keys of sufficiently intricate shape and construction, and, by preference, designed so as to be difficult of manufacture, and with slots, perforations, or wards formed therein. The keys may, if desired, bear, in addition to the company's stamp, a private mark, known only to the officials, and may be employed in various sizes representing different amounts of gas.



The starting arrangement of the meters for which the cheques are used is constructed by preference somewhat like a lock with wards or projections, and levers to correspond, with the cheques or keys. These, after being inserted and used to start the mechanism, fall into and are retained within a receptacle formed, in or connected with, the meter, to be cleared or collected by the official in his ordinary rounds. The cheques or keys may be caused to act on locks or releasing mechanism, by being formed as push keys, or as turning keys or otherwise, and by preference have a removable handle for use therewith, whereby the cheques or keys may be inserted into the lock or releasing mechanism of the meter, and left there to fall into the receptacle by withdrawing the handle. Various kinds of releasing mechanisms may be employed, and the improvements may be applied to those mechanisms which start and stop the measuring or meter apparatus, or to mechanisms which actuate a valve for regulating the supply of gas.

The illustration shows a sectional elevation, and a plan view (partly in section) of the index portion of one form of meter, with one example of apparatus arranged in accordance with these improvements.

A is a star-wheel mounted to turn upon a shaft or spindle, and arranged with suitable teeth or projections. B is a key or cheque, inserted, from the the outside of the apparatus, through a hole (provided with wards or projections, into which the key fits), by means of the handle C, upon the end of which the key is temporarily placed for the purpose. Upon the key being turned in what may be termed the lock, the lever D is first lifted, and with it the locking projection thereon; thus enabling the star-wheel to be moved one tooth by the further turning of the key. It will thus be seen that one key can only turn the star-wheel the distance of one tooth or division. There are also mounted to turn on the same spindle a cam-wheel E, and a toothed wheel F. The star-wheel A, and the toothed wheel F, are both capable of communicating motion to the cam-wheel E, by means of clutches G, or similar means. Upon the key unlocking and moving forward the star-wheel A, the motion is communicated to the cam-wheel to the same extent, and the raised portion of the cam presses forward the valve-spindle H, thus opening the valve J, and letting gas into the meter. Upon the gas being used, the ordinary mechanism of the meter is put in motion along with the toothed wheel F, which starts on its journey to the position of the cam-wheel E. Upon this being accomplished, gas of the value represented by the key or cheque has been used, and the toothed wheel sets the cam-wheel in further motion for a short distance, allowing the spring K, to force the valve-spindle point into the depression of the cam, and so close the valve, and cut off the further supply of gas, until a new key or cheque is inserted, and the star-wheel and cam moved a second section. Once the key is turned in the key-hole of the look, it cannot be re-turned; but, upon the handle being withdrawn, the key-head or cheque falls into a receptacle formed for the purpose within the casing. Several keys may be inserted, one after the other; so that if desired more gas than the value of one key may be prepaid.

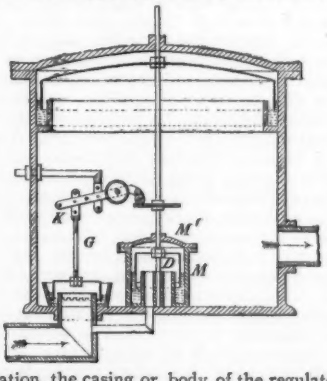
In the example shown, the cam is formed with step depressions, so that the lights are not immediately extinguished on the limit of the prepaid supply being reached, but are turned low by way of warning, which, if disregarded, further use will close the valve at the next step in the cam. The cam may, however, be formed to close the valve suddenly, if found desirable.

Igniting Apparatus for Gas-Engines.—Abel, C. D.; communicated from the Gas Motoren Fabrik Deutz. No. 18,746; Nov. 22, 1889. [6d.]

This igniting apparatus for gas motor engines consists of a metal tube heated by an external flame within a surrounding casing, such as is described in patent No. 11,444 of 1887. According to the present improvement, instead of effecting the heating of the metal tube by a gas-flame, it is heated by a flame of petroleum vapour, for which purpose the igniting tube has its open end fitted into the passage of a horizontal cylindrical casing surrounding the igniting-tube, and communicating by its passage with the engine cylinder. At or near the end of the casing next the cylinder, a passage is formed in the body, extending partly round it, and open at each end (the ends being presented downwards); and between these two openings is formed an opening in the side of the casing itself, surrounded by a tubular branch. To one end of the passage is attached a pipe, through which it is supplied with liquid petroleum, and to the other end is connected one end of another pipe, whose other end is bent up (so as to face the branch tube on the casing) and terminates in a nozzle. Thus, assuming the igniting tube and casing to be heated, the liquid petroleum entering the passage of the casing will become volatilized by the heat; and the vapour, issuing with force from the nozzle at the other end, will carry air along with it into the branch tube and casing, and on entering into combustion, the flame will impinge upon the igniting tube and the interior of the casing, thereby highly heating these parts and the passage through which the liquid petroleum passes.

Gas Regulator.—Parker, F. W.; communicated from W. C. Rossney, of Boston, Mass., U.S.A. No. 19,019; Nov. 26, 1889. [8d.]

This invention relates to apparatus for automatically regulating and controlling the supply of gas delivered to burners independent of the pressure in the main or supply pipe leading from it to the regulator.



In the illustration, the casing or body of the regulator is shown as having a base or bottom and a detachable cover; and on the interior of

the casing is an annular cylinder containing mercury. The regulating holder is made in the form of an inverted cup, the lower edge of which is sealed in the liquid in the cylinder; while the cover has a central perforation, in which is loosely guided a rod adjustably secured to the holder in a gas-tight manner. The gas-supply pipe leads from the main supply to the lower part of the interior of the casing; and to it a valve is adapted to close and open the pipe. G is the value steam or rod of the valve; its upper end being adjustably connected to the weighted lever K, pivoted to an adjustable fulcrum bar or bracket, secured to the case or body. To the weighted end of the lever is journalled a wheel or roller, which, by the influence of the weight, is made to press and rest on the top of a disc attached to the gasholder stem. The lower end of this stem is guided in a vertical pipe secured to the base. To the stem near its lower end, is connected an inverted cup-valve D, which is of a size equal to that of the valve; and the valve itself has its lower edge constantly sealed in the mercury contained in the valve-case or cylindrical cup M, secured to the interior of the base. M^1 is a cross-bar or cover attached to the top of the cup, and having a central perforation, through which the stem passes loosely and in which it is guided. There is a small pipe or channel leading from the supply-pipe to the interior of the cup M below the valve D.

It will thus be seen that the valves employed being of equal size, and actuated by the same gas-pressure from the supply-pipe are balanced, and are actuated independently of the pressure in the main or supply pipe. For the sake of example, suppose the holder and the constantly sealed cup-valve D to be in their highest positions, as shown, and the inlet-valve closed. If the pressure of the gas within the regulator be now reduced by the opening of one or more burners, the holder descends, causing a downward movement of its stem disc and the liquid-seated valve D; and thus the weight on the lever K causes the roller to partake of the movement of the disc and thereby trips the lever K, and causes the valve to open for the admission of gas to the regulator. As long as the consumption of gas is equal to the supply, the valve will remain open; but if it should be lessened, the holder will rise, and in so doing its disc will gradually move the weighted lever K, so as to close the valve. The valve will remain closed until the pressure in the body is lowered, when the holder will descend, and thus cause a gradual opening of the valve; and so on.

Rendering Water and Producer Gases Odorous.—Scudder, F., of Clapham Common, and Coleman, H. G., of Walham Green, London. No. 2341; Feb. 13, 1890. [4d.]

In the course of their specification, the patentees point out that, as is well known, great danger has heretofore attended the use for illuminating and other purposes of gases such as water gas and ordinary producer gas; these gasses being of themselves inodorous, but containing carbonic oxide. To render such gases odorous, in order that any escape should be readily detected, mercaptan and other substances have been employed; but so far all these have been of a kind liable to condense and settle in the mains or apparatus—thus freeing the gas, more or less, from the odour essential to its use with safety.

The present invention has for its object the treatment of such gases so as to impart to them an odour that shall be readily perceptible and lasting, and not liable to be lost or appreciably diminished by condensation. As an odourizing material a volatile organic sulphide is produced by acting on acetone with sulphuretted hydrogen in presence of a suitable dehydrating agent such as hydrochloric acid, with or without zinc chloride, or sulphuric acid of a suitable strength—say of a specific gravity of 1·4. The volatile organic sulphide can be readily volatilized by the use, in moderate quantity, of steam that serves to carry the sulphide to the gas to be impregnated. The volatile organic sulphide (thio-acetone or sulphurized-acetone) above referred to can be conveniently prepared as follows: Five parts by weight of acetone (having a boiling-point between 133° and 137° Fahr.) are mixed with four parts by weight of hydrochloric acid of specific gravity 1·16. The mixture is cooled to (say) about 60° Fahr.; and to it one part by weight of zinc chloride is added. This mixture, which should always be freshly prepared, is then divided into four or more portions, each of which is placed in a suitable vessel; these being arranged in series so that a current of sulphuretted hydrogen can be passed successively through each vessel. The mixture must then be treated with sulphuretted hydrogen in a single vessel; but the sulphuretted hydrogen can be used up to better advantage by employing a series of vessels—four, for preference. After the sulphuretted hydrogen has been passed successively through the four vessels for eight to ten hours, the first vessel of the series is disconnected; and the second, third, and fourth vessels are caused to become the first, second, and third vessels respectively—a freshly prepared mixture (such as above described) being placed in another vessel, which then constitutes the fourth vessel. This procedure is repeated every eight to ten hours (a first vessel being each time disconnected, and a new fourth vessel being added), by which means the mixture is thoroughly exposed to the action of the sulphuretted hydrogen. The resulting produce contains an oil and an aqueous solution, both containing thio-acetone; the former the larger quantity.

For the purpose of odourizing the gas, the oil may be either separated off and passed directly into the odourizing reservoir, or the raw mixture may be distilled in a current of steam at atmospheric pressure; the distillate being allowed to flow directly into an odourizing reservoir, forming part of any suitable form of apparatus for adding volatile substances to gases—such as that described in patent No. 6130 of 1889. Through such an apparatus a portion of the gas to be treated is passed from the main pipe or conduit by means of a bye-pass, and after traversing the evaporating or odourizing chamber of the apparatus, it is led through a purifier containing hydrated oxide of iron, for the purpose of removing any free sulphuretted hydrogen which may have been introduced into it.

Gas and Vapour Burners.—Welch, W., of Portsmouth. No. 5293. April 8, 1890. [6d.]

Using the words of the patentee, as contained in his specification, the object of this invention is the construction, and equipment of gas-burners for producing a more perfect combustion and incandescence, in the use of coal, water, and oil gases, and in destroying the noxious and deleterious effluvium arising in the burning thereof. The claims made for the invention are: "1. The construction of expansion chambers or spaces within the interior of the burners for increasing the volume of the gases after entry from the supply-pipe. 2. The filtration or purifying of the gases within the burners by passing through granular, or porous, or vacuous medium of similar or dissimilar substances, whereby disintegration is attained previous to passing to the surface of ignition, and producing greater incandescence. 3. The superheating the gas previous to coming in contact with the atmospheric air, by passing through heated fire-proof or porcelain surfaces. 4. Preventing the escape of noxious effluvium, by the expansion, filtration, and superheating the surface of ignition, without being in contact with heated iron or metal pipes and surfaces."

APPLICATIONS FOR LETTERS PATENT.

14,933.—Sweet, A., "Improvements in mercurial gas-governors." Sept. 22.

14,995.—Thorp, T., "A new and improved gas-tight packing for gasholders." Sept. 23

15,092.—Suggate, F. C., "A new or improved photometer." Sept. 24.

15,208.—Sawyer, W. J., "An improved gas-governor and pressure indicator." Sept. 25.

15,388.—Braidwood, J. F., "An improved method of, and apparatus for, charging retorts for the manufacture of gas and other like purposes." Sept. 29.

15,409.—Love, J., "Improvements relating to duplex and other gas-burners, and to fittings connected therewith." Sept. 29.

15,438.—Crompton, B. F., "A compound gas-burner." Sept. 30.

15,463.—Upton, C. S., "Improvements in incandescent gas-burners." Sept. 30.

15,550.—Perman, S. H., and White, E. J., "An improvement in the construction of valves or cocks for liquids, gas, steam, and atmospheric air." Oct. 1.

15,637.—Goode, T., and Smith, A., "An improved process for recovering sulphur from alkali waste." Oct. 2.

15,711.—Bell, R., and M'Millan, J. G., "Improvements in gas motor engines." Oct. 4.

15,738.—Griffin, S., "Improvements in apparatus for, and the application of, hydrocarburetted air or combustible gas to actuate motive-power engines." Oct. 4.

15,742.—Ruthven-Murray, E. T., "Improvements in machinery for charging and drawing gas-retorts." Oct. 4.

The Lighting Question at Shipley.—A deputation from the Shipley Tradesmen's Association waited on the Shipley Local Board at their meeting last Tuesday, to urge upon them the duty of securing the better lighting of the streets, either by improved gas illumination or by adopting the electric light. Most of the members of the Board agreed that better lighting was needed; but the Chairman reminded the deputation that Shipley could not expect to compete with Leeds and Bradford in the way of lighting, and electricity would cost three times the amount they were paying for gas. The Board, however, decided to take the whole question of lighting into consideration; and, if found at all practicable, to adopt the electric light.

The Water Supply of Ilkeston.—At a meeting of the Ilkeston Town Council last Tuesday, there was some discussion on the question of the borough water supply. In answer to Mr. Mitchell, the Town Clerk stated that up to March 25 last £21,913 had been borrowed by the town for works of water supply; and £16,874 was still outstanding. This did not include £7500 recently borrowed, and not yet expended. Mr. Mitchell moved several amendments to the minutes of the General Works Committee on the water question. He contended that he had all along opposed the Kirk Hallam water scheme, and had predicted its failure. His predictions had come true; for they had now run through what was said to be an inexhaustible supply, and if they bored through a fault into another water area, he thought they would find very little water. They had spent £29,000 on water schemes which were not now worth £5000. Several members supported the action of the Committee; and the amendment was negatived. Mr. Mitchell then moved the rejection of a minute appointing Alderman Sudbury, Mr. S. Bloor, and the Surveyor a Sub-Committee to supervise and carry out the necessary underground works at Kirk Hallam, for the purpose of increasing the supply of water; and instead he proposed that a practical man be selected to advise the Council on the whole question. This proposition was also defeated.

Proposed Improvements at the Reading Water-Works.—At the last monthly meeting of the Reading Town Council, the Water Committee submitted two reports drawn up by the Water-Works Manager (Mr. A. T. Walker), in one of which he dealt with the existing borrowing powers for water-works purposes, and in the other with the additional works which he considered were necessary for improving the supply. It appeared that the only amount which could be raised under the present powers for extending the works was £3000, which must be obtained by the issue of Corporation stock. With regard to supplementing the power of the Fobney works, Mr. Walker suggested that steam pumping power applied by means of a Worthington triple-expansion engine, or engines capable of delivering 2 million gallons per 24 hours, would be the most desirable for adoption. He proposed increasing the efficiency of the present filter-beds, and constructing an additional one; and also carrying out certain improvements at the source of supply. The estimated cost of his proposals, inclusive of contingencies, amounted to £20,313; and in addition to this, he thought it well to add £5000 for the special purpose of main extensions. The Committee recommended the adoption of these reports, and that the matter be referred to a Committee of the whole Council, with full power to authorize the preparation of the requisite plans of the proposed works, and to make application to the Local Government Board for a Provisional Order for altering and amending the Water Acts, so as to make provision for additional powers to borrow money. The recommendations were adopted.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

Mr. Thorne's Repudiation of the Union's Responsibility.

SIR,—In your issue of last Tuesday, Mr. Thorne is reported to have said, at the meeting, or conference, at the Horseferry Road, that "he was ignorant as to the demands which had been sent to Mr. Trewby;" "he had been away, and did not know their nature." If this be true, it is time that the Union obtained a more efficient Secretary or a less impudent Assistant-Secretary.

Mr. Thorne is also reported to have said: "The Manchester strike, which was supposed to have been caused by the Union, was not their fault at all. He went to Manchester and told the men that it was the desire of the Union that they should return to work; but they were not allowed to withdraw their notices." This is a most astounding statement. Before and during that struggle Mr. Thorne was frequently in Manchester, and made many characteristic speeches, which were pretty fully reported in the Manchester papers. I have before me now cuttings from all these papers, and have carefully re-read the reports of Mr. Thorne's speeches. I do not hesitate to say that, from the beginning to the end, the whole tone and tenor of these speeches was: "Strike, if you don't get what you want—strike, and drive the non-Union men out of the works, even if you do put the town in darkness; and that will bring the Gas Committee to their knees." Mr. Thorne never advised the men to withdraw their notices; and the men never asked for permission to do so. Twice the men were given the opportunity of withdrawing their notices, but did not avail themselves of the privilege. While the strike was in progress, up to and including that memorable Sunday on which John Burns was present in Manchester, and, seeing the game was up, beat a hasty retreat back to London, the language of Mr Thorne was simply abusive all round. And when he found that the public did not respond to his appeal for funds, and did not sympathize with the senseless advice which he had given to the poor deluded men whom he had so wofully deceived, he, too, repudiated the whole affair, went back to London, and left poor honest Horrocks to bear the blame, and starve for aught he cared. All this, and more, is clearly set forth in the newspapers of the day; and a reference thereto will fully prove what I state to be true.

These leaders ought at least to be truthful. Some of them seem to be afflicted with bad memories. It will be an interesting process to contrast some of their former with their present utterances, and especially to put side by side speeches made before a strike and after the strike has failed.

Oct. 9, 1890. CITIZEN.

Mr. Cripps and the Gadd and Mason System of Gasholder Construction.

SIR,—My attention being drawn to a paragraph in your last issue, regarding a quotation contained in a circular of Messrs. R. and J. Dempster, relating to the new gasholder, I desire to say that the words were taken from one of several letters I received from Mr. Cripps in the course of a correspondence. When I supplied the quotation, amongst others, it did not strike me as likely to be objected to as any betrayal of private correspondence; but as Mr. Cripps objects to its appearance, I have requested Messrs. Dempster to withdraw the same in future from their circular.

Longsight, Manchester, Oct. 8, 1890. W. F. MASON.

"A NORTHERN GAS ENGINEER," writes for information. He says: "During this last summer, various alterations were made at the gas-works with which I am connected, especially in the erection of a set of condensers, and the altering of the position of the washing and scrubbing apparatus. Formerly the gas, after leaving the hydraulic main, passed through a condenser which was a series of perpendicular 9-inch pipes. Next it passed into, and up through, a scrubber filled with thin boards, which were kept wetted with ammoniacal liquor. After this, it passed through a washer of three compartments; the last being clean water. Thus, condensing, scrubbing, and washing was the process the gas was subjected to, between the hydraulic main and the purifiers. The change has been as follows: A series of steel tubes 2 feet in diameter, with another tube inside 18 inches in diameter, thus leaving a 3-inch space between the two tubes for the passage of the gas and presenting a large cooling surface. The gas next passes into the washer; and finally into the scrubber. This latter change is reversed from the first-named process. Query, Was this a proper change to make—washing before scrubbing? Further query, The gas, after passing the washer and scrubber is raised in temperature from 3° to 6° higher than after it leaves the condensers. Why is this?"

The Water Supply of Llanelly.—Owing to complaints having been made by the proprietors of various tin-plate works in the town as to their water supply, the Llanelly Local Board have resolved to improve their distributing system at an estimated cost of £9000.

The Finances of the Leeds Corporation Gas and Water Departments.—Mr. W. Derry, the Borough Accountant of Leeds, has just issued his abstract of accounts for the year ending March 25 last. In the portion dealing with the Gas Department, under the head of expenditure in the revenue account, the following figures are given: Gas manufacture, £160,733 (£112,106 being for cannel and coal, and £41,812 for wages); repairs and renewals, £28,454; general expenses, £16,024; interest on loans, £40,316; and interest on banking account, £2111. The total expenditure was £247,681; and the account shows a net profit on the year of £14,893. Gas-rental produced £188,230; public lamps, £9704; meter-rental, £10,189; and residuals, £62,389. Of the profit of £14,893, £9470 has been transferred to the sinking fund. The water-works accounts show a surplus profit of £3965, after transferring £14,404 to the sinking fund. Water-rental produced £91,163. The principal items of capital expenditure were £4865 on the Eccup extension, £2163 on the Blackmoor tunnel, £5113 on the Arthington main, and £15,151 on the main in the Meanwood Valley.

MISCELLANEOUS NEWS.

METROPOLIS GAS SUPPLY.

The Chief Gas Examiner for the Metropolis (Dr. Williamson, F.R.S.) has presented his report on the quality of the gas supplied by The Gaslight and Coke, the Commercial, and the South Metropolitan Companies, during the quarter ending Sept. 30, 1890. The following is an abstract:—

I. *With respect to Illuminating Power.*—The average illuminating power, in standard sperm candles, at each of the testing stations, was as follows:—

The Gaslight and Coke Company—	
Jewry Street, E.C.	Closed
Cloth Fair, E.C.	16·5
Dorset Buildings, E.C.	16·5
Ladbroke Grove, W.	16·7
Devon's Road, E.	16·5
Carlyle Square, Chelsea, S.W.	16·2
Camden Street, N.W.	16·4
Graham Road, E.	16·7
Kingsland Road, E.	16·4
Spring Gardens, S.W.	16·1
Grove Gardens, Regent's Park, N.W.	16·4
Hornsey Road, N.	16·8
Lambeth Road, S.E.	16·2
Millbank Street, S.W. (cannel gas)	20·6
Commercial Gas Company—	
Parnell Road, E.	16·5
Wellclose Square, E.	16·3
South Metropolitan Gas Company—	
Hill Street, S.E.	16·5
Foster Place, S.W.	16·4
Stoney Lane, S.E.	16·5
Lewisham Road, S.E.	16·4
Burrage Road, S.E.	16·2
Blackfriars Road, S.E.	16·4

It will be seen from these results and the tables appended, that the average illuminating power at all the testing-stations of the three Gas Companies has been higher than the requisite standard. At Graham Road and Millbank Street, the minimum illuminating power was above the requirements. At Camden Street, Kingsland Road, and Hornsey Road, it was equal to them. The following deficiencies were reported during the quarter:—

	Candles.
The Gaslight and Coke Company—	
Ladbroke Grove, Sept. 20.	15·7
Devon's Road, Sept. 12	15·6
Carlyle Square, Sept. 11	15·7
Spring Gardens, Sept. 1	15·2
Grove Gardens, Sept. 26	15·8
Lambeth Road, Sept. 12	15·7
Commercial Gas Company—	
Wellclose Square, Aug. 6.	15·1
Parnell Road, Sept. 3	15·8
South Metropolitan Gas Company—	
Bedford Road, Sept. 22	15·3
Stoney Lane, Sept. 5	15·6
Blackfriars Road, Sept. 30	15·3
Burrage Road, Aug. 13	15·5

II. *As regards Purity.*—Sulphuretted hydrogen was only once present in the gas throughout the quarter—viz., at the Parnell Road station on July 12. The Commercial Gas Company have lodged an appeal against this return. The average amount of sulphur present in the gas at all the testing-places was considerably less than the amount allowed—viz., 17 grains—especially at the Devon's Road and Lambeth Road stations of The Gaslight and Coke Company, the Parnell Road station of the Commercial Gas Company, and the Hill Street, Bedford Road, and Burrage Road stations of the South Metropolitan Gas Company. The following excesses were returned:—

	Grains.
Millbank Street, Aug. 7	26·0
Millbank Street, Aug. 8	21·4
Graham Road, July 17.	17·8
Kingsland Road, Sept. 25 and 29	19·9
Grove Gardens, July 15	17·8
Hornsey Road, Aug. 7.	19·9
Blackfriars Road, Aug. 22.	17·4

Ammonia was generally present in the gas throughout the quarter at all the testing stations, but only in slight quantities. At the Bedford Road and Lewisham Road stations of the South Metropolitan Gas Company, it appeared very seldom. The quantity permitted was not exceeded on any occasion during the quarter.

THE RECENT LOCK-OUT OF GAS STOKERS AT LEEDS.

Return of the Cost and the "Estimated Benefits."

Last Thursday, the Borough Accountant of Leeds (Mr. W. Derry) circulated among the members of the County Council copies of a return as to the cost of the recent lock-out of gas stokers. This shows that the expenditure of the Gas Committee was £2509; of the Watch Committee, £524; and of the Lamp Committee (being the cost of repairing the damage done to public lamps), £36—making a grand total of £3069. Accompanying this return was one showing the cost of the demands of the men and the estimated benefits of the new terms under which the men are working. This was as follows: "Wages paid for gas manufacture during the half year ended June 30, 1890, £24,345. Wages for the half year ended June 30, 1889, £17,108, which amount, if the same quantity of coal had been carbonized as in the half year ended June 30, 1890, would have been increased to £17,841—thus showing that the cost of the demands of the men would be £6504 for the half year, or at the rate of £13,008 per annum. Cost of the carbonization of coal for the half year ended June 30, 1890, when during each shift 52½ cwt. of coal were carbonized, £21,452. Assuming that during each

shift 60 cwt. of coal had been carbonized, according to the new terms, the cost would have been only £18,770. The estimated benefit, therefore, to the Corporation under this head for one half year is £2682 or, say, £5364 per annum. There is, however, a further benefit with respect to the agreement as to holidays. The men demanded one week in the year, in addition to Christmas Day and Good Friday, previously allowed, which represented an estimated loss to the Corporation of £790; but under the new terms, they have been allowed only two days in addition to Christmas Day and Good Friday—viz., Whit Monday and the first Monday in August; thus increasing the estimated benefit to the Corporation under this head by £526 per annum. Recapitulation: Cost of the demands of the men, £13,008 per annum. Estimated benefit to the Corporation under the new terms: Carbonization of coal, £5364 per annum; holidays, £526 per annum—total, £5890."

THE STRIKE OF GAS STOKERS IN MELBOURNE.

In previous issues of the JOURNAL reference has been made to the strike of gas stokers which lately took place in Melbourne, in connection with a similar movement, which had shortly preceded it, in the shipping trade. Copies of local papers, containing full accounts of both events, have just reached us; and from these we take the following particulars, which, in view of recent labour agitations in the gas industry in England, will doubtless be specially interesting to our readers.

It is scarcely necessary to go into the details of the dispute between the ship-owners and their employees; but a short explanation will be necessary to the clear understanding of the situation. It appears that some months ago an agitation was set on foot by the marine officers to obtain shorter hours and increased pay; and with the view of better securing these objects, they formed themselves into a Union. In due time the ship-owners were apprised of the wishes of the officers; and, after giving the matter fair consideration, asked them not to affiliate themselves, as they proposed to do, with the Trades Hall Council—the controlling body in the Unionist labour market; at the same time promising them certain concessions. The officers' demands came upon the ship-owners in conjunction with others from the seamen; and it was estimated that the concession of them all would involve an extra expenditure of about £200,000. The result of the agitation was a general strike, and the paralyzing of the entire shipping trade. The cessation of work in unloading vessels which was the immediate consequence of the strike, necessarily threatened to stop the supply of coal to the works of the Melbourne Gas Company. In these circumstances, the Secretary (Mr. T. Vasey) approached the Wharf Labourers' Society, and asked if they would be willing to unload coal from vessels that were specially consigned to the gas-works. He also mentioned that arrangements could be made for the Union rules to be observed in connection with this special supply. The matter was referred to the Trades Hall Committee of Finance and Control, who drew up a schedule of terms on which the coal would be received, and forwarded them to Mr. Vasey. This gentleman replied the next morning, and asked that the *Norkoowa* might be permitted to be discharged without the imposition of any conditions that only applied to the sailing of ships, as his Directors regarded the two questions as being quite distinct in character. To this the Committee answered that the conditions in question were the result of the Secretary's own suggestions made to the Committee at a previous meeting, and therefore they must decline to alter them; and they would hold themselves blameless for any inconvenience which a refusal to recognize them might cause the Company or the general public. The Directors then turned their attention in another direction, and arranged for the ship in question to be unloaded with non-Union labour. When, however, a portion of the coal cargo had been transferred into the yard, the attention of the Gas Stokers' Society was called to the fact; and the question at once arose as to whether the members would agree to handle coal that had been unloaded in this way. The members of the Union were very unwilling to take any action which might interfere with the gas supply; but at the same time they did not wish to do anythng that would materially assist the ship-owners in their struggle with the Labourers' Union. A meeting of the Stokers' Society, at which about 400 men were present, was held to consider the point; and it was arranged that the matter should be placed unreservedly in the hands of the Trades Hall Committee of Finance and Control, with the understanding that the gas stokers should go on with their work as usual, until they received specific instructions from the Committee. The Certificated Engine-Drivers' Society also had a meeting, and decided that the members of their body who were engaged at the gas-works should be guided as to their action by the decision of the Trades Hall Committee in the stokers' case. On the following morning (Aug. 26), a deputation from the Stokers' Society waited upon Mr. Vasey to see if there was any possibility of settling the difficulty without resorting to hostilities. The Secretary of the Union said the men were very undesirous of proceeding to extremities if the matter could be adjusted in any other way. Although a good deal of coal had been brought into the works from vessels unloaded by non-Union men, they would make no objection to handling the coal if an arrangement were arrived at for the Union system to be observed in future. Mr. Vasey replied that the Directors could not comply with the request without breaking the contract entered into between the Company and the coal importers; and this was a step they were not prepared to take. The deputation then withdrew, and immediately afterwards the stokers and firemen, to the number of about 450, sent in their notices, announcing their intention to leave in 24 hours. The engine-drivers decided to give 36 hours' notice; adding the extra 12 hours because attention would be needed at the engines for some time after the stoking had ceased. During the morning the Directors held a meeting to consider the action taken by their employees; and it was decided to issue placards all over the city, and advertise for men to fill the vacant places. The next morning the stokers and other hands at the West Melbourne works, numbering about 280, left the establishment. The scene was one of great excitement; a crowd of something like 6000 people having assembled. As the men passed through the gates, they gave cheers for the Manager (Mr. J. T. Wynne); and many of them returned to their duties later in the day. After the men had left, the crowd gradually increased; and in the afternoon the police had great trouble to keep the entrance to the works. From time to time small parties of non-Unionists managed to pass the pickets and enter the gates. Some, however, were not so successful; and a cab load of men was seized by the crowd and the vehicle overturned. The men managed, after a rough-and-tumble fight, to make their escape; but the cab was badly damaged—the consequence being that for the rest of the day a cab to visit the gas-works could not be engaged. In spite, however, of all precautions, nearly 40 men succeeded in entering the works, and several carts with bedding and provisions ran the gauntlet without being detected. At six o'clock the works were surrounded; and a complete system of pickets had been established. In response to the Company's application for assistance, nearly 200 men had been collected at the head office; and during the night the major part of these were successfully distributed between the South Melbourne, Richmond, Fitzroy, and West Melbourne works. Until late in the evening the pickets were out in every direction; and many of the non-Unionists were persuaded to relinquish their employment. Still, in spite of all efforts to the contrary, the Company succeeded in obtaining the services of nearly 200 men, all of whom it was decided to board and lodge on the works until the normal conditions of working could be restored. When the stokers' intentions had been made known, the Secretary of the Company wrote to the local papers to apprise the public that the supply of gas might not possibly be so full as usual, until the new hands had become accustomed to the work; but that the city and suburbs would not be left in darkness without sufficient warning being given. To meet the emergency, strenuous efforts were made by all the Company's officials; the clerks, collectors, meter inspectors, and permanent way men all cheerfully working to their utmost capacity to keep up the supply of gas. In this, however, it is no discredit to them to say, they were not entirely successful, seeing that, according to what transpired at a meeting of the Gas Stokers' Society, the Company had lost something like 1000 hands; in addition to which the "free" coalies had been mobbed, and consequently their operations had to be suspended. The foregoing is a brief record of the course of events up to the evening of the 27th of August.

On the morning of the 28th, things wore a rather serious aspect. Quite early people began to assemble in the neighbourhood of the West Melbourne works; and before eight o'clock a crowd of about 4000 persons had collected—giving to the place all the appearance of a beleaguered citadel. Police protection had been afforded to the Company; and in addition to those stationed inside the works, a force of 23 constables and 10 mounted men was told off for strike duty. But there was a noticeable change in the attitude of the crowd as compared with their conduct on previous days; owing, probably to the intimation having been given that the instigators of, or participators in, any disturbance would be arrested. Accordingly the mob for the most part contented themselves with gazing at the blank walls of the works, and made no attempt at intimidation by word or deed. The reports of the pickets by whom the place had been surrounded during the night increased the exultation of the crowd. In spite of the careful watch kept within, it was found impossible to entirely cut off communication with those outside; and, in the dark, messages were constantly exchanged between the non-Unionists and the representatives of the strikers. The effect of this was visible at daybreak in the discontented spirit manifest among the volunteer labourers. Many of these were of poor physique; and even to those in better condition the labour of stoking had proved almost unbearable, and several of them had broken down altogether. The result was that the night's work was practically *nil*; for the holders were barely 6 feet higher than on the previous evening. In view of the condition of his men, and of the fact that some of them had been sorely tempted by promises held out by the Union delegates, three or four of whom had actually scaled the walls of the works, Mr. Wynne decided to suspend operations until he received further instructions from his Directors. This decision was, by some mysterious means, almost immediately reported to the crowd outside, and was greeted with cheers. Scarcely had Mr. Wynne quitted the works than the discontent among the non-Unionists came to a head. They held a sort of informal meeting, as the result of which six or seven of them decided to leave. On the assurance of the Union supporters that no violence would be attempted, they passed through the gates, amidst the sarcasm of the crowd and made good their escape without being in the slightest degree molested. This reduced the force within the walls to about 60, independent of the men supplied from other departments. Nevertheless, the Directors determined to hold out; and before noon the furnaces were again in full work. After a time, however, it was found that the forces available were inadequate; and consequently the effort to keep up the make was abandoned, and the men were employed in simply firing with coke to prevent the retorts from cooling. With the view of maintaining a supply of gas, an attempt was made to connect the West Melbourne mains with the North Melbourne holders; but, owing to the apathy of the police, this was entirely frustrated by the mob. This was, it seems, not a solitary instance of inertness on the part of the constables; for complaints were made by nearly all employers of labour affected by the strike. The position of affairs at four o'clock was something like this: At the South Melbourne and North Melbourne stations, a large supply of gas, possibly enough, with economy, for two nights, was available; at Fitzroy and Richmond the stock was barely sufficient for the night; and at West Melbourne only a few thousand feet could be reckoned upon. Practically, the combined stock of gas was inadequate to meet the demands of the metropolitan area for more than a night. Every possible precaution was taken to minimize the demand so far as possible; and though in the earlier part of the evening a few street lamps were lighted in the main thoroughfares, it was judged necessary before eight o'clock to discontinue their use entirely. After that hour every street in the city was in darkness, as far as gas was concerned; but fortunately the moon was at the full, and this greatly relieved the gloom. The Mayor of Melbourne (Mr. Lang) accordingly requested the Company not to light the street lamps while this favourable condition las ed;

and thanks to this assistance, the supply held out better than was expected. The householders for the most part resorted to candles and kerosene lamps for their light. Special efforts were made to reinforce the non-Union stokers at the different stations. In addition to the inspectors and meter men already drafted to the work, another call was made upon the general employees; and a goodly number of clerks and assistants in the store branch were despatched to the weakest points. It was not anticipated that any disturbance would occur; but, for greater safety, the men went separately and well armed. Late in the evening the officials at the head office received information by telegram that all had reached their destination without difficulty. In consideration of the riotous proceedings which had occurred at various places in the city during the strike, and the apathy of the police in dealing with the instigators, it was decided to enlist the services of special constables to maintain order. A detachment of artillery was also brought in and billeted in the city, so as to be ready for any emergency.

On the night of the 29th, the city was absolutely in darkness; for the inhabitants were deprived of the inadequate supply of gas they had on the previous evening. But the deprivation was not very seriously felt. Thanks to the brilliant moonlight, the street lamps were easily dispensed with; and there were no riots or outrages, which were predicted as the result of the city being without gas. The temporary loss of the usual illuminant was merely regarded as an inconvenience. In this stoppage of the regular supply, the suburbs were not included. Indeed, it seems there was no reason but that of expediency why the city should not have been equally served. There was a fair quantity of gas in the holders at West Melbourne; but, in view of the uncertainties of the position, the Company thought it advisable to husband their resources. In the meantime, the retorts were kept in active operation, and every effort was made to obtain a supply of labour—as much as £1 a day being offered for stokers. The Directors hoped that in the course of a few days the exceptionally high wages offered would attract a superior class of labourers. But they had enough hands to continue the manufacture of a small supply of gas; and, if necessary plenty of volunteers were available—in fact, they were deluged with applications from all classes of the community. They, however, felt no pressing necessity to accept these proffered services. The work of gas manufacture was proceeding actively, and the new hands were making fair headway; so, altogether, the Directors took a hopeful view of the situation. The public excitement which had been caused by the strike was evidently beginning to subside. The wharves during the day were almost deserted; and even in front of the gas-works the crowd had shrunk to a few hundred persons. The sight of the steadily rising gas-holders attracted a group of people to the side wall of the works; and there was a little occasional hooting and groaning. But the spirit had perceptibly died out of the whole thing. Even the pickets were inactive; and the reinforcements to the ranks of the non-Unionists were allowed to enter the gates without any opposition. For the moment the crowd transferred their attention to the head offices, where the operation of paying off the strikers was going on. Still there was no public demonstration whatever; and the presence of a small body of troopers was sufficient to keep the crowd in check. In view of the public inconvenience caused by the stoppage of the gas supply, negotiations were entered into between the Trades Hall Committee and the Gas Company, with the object of agreeing upon a temporary arrangement pending the settlement of the shipping strike. Messrs. Hancock and Murphy waited upon Mr. Vasey, and a long conversation took place on the subject. It was stated that the men on strike would be willing to return to work on certain conditions. It was understood that there was in the yards about three weeks' supply of coal, which had been laid in before the strike commenced, and subsequently a smaller quantiy unloaded from some of the ships by the non-Union labour. The members of the Gas Stokers' Society were prepared to go back and use up the whole of this stock. If the strike was not concluded before the coal was exhausted, arrangements would be made to unload a further supply from some of the ships which were laid up with full cargoes of coal. They would not go back, however, unless all the non-Union men engaged were discharged. The matter was laid before the Directors of the Company; and they decided that they would agree to the terms proposed if the last condition—viz. the one respecting non-Union men—was omitted. They would not consent, however, to dismiss the men they had just taken on. A reply to this effect was forwarded to the Trades Hall Committee; but the modified proposal was rejected. Notwithstanding this and other efforts at conciliation—for the strike, as a whole, was beginning to have an increasingly disastrous effect on the general tone of business—the military force in the city was further strengthened; and it was decided to call out 200 of the Mounted Rifles, the Victorian Rangers, and all the available cavalry, to be employed in the protection of the public buildings. In addition to these measures, the swearing in of special constables was rapidly proceeded with; some 40 of the Company's officers volunteering their services.

There was little change in the position of affairs on Saturday, the 30th; but it was in the Company's favour. There was necessarily only a very scanty supply of gas at night, and candles and lamps had to be resorted to. Several shops, however, were provided with electric light; and, considering all the circumstances, the citizens were not put to much inconvenience. Reference has already been made to the quieting down of the excitement caused by the strike. Now a strong feeling against the leaders of the movement began to show itself; it being generally recognized that there was no necessity to call out the gas stokers, except as a means of terrorizing and coercing public opinion. On the following day (Sunday) there was a decided improvement in the supply of gas; and as some of the churches were closed in the evening, and others had the usual evening services in the afternoon, there was less demand than usual upon the resources at the gas-works. By this time the Directors and officials of the Company had become quite confident that there would be no further difficulty in keeping up the supply. The new men were displaying more adeptness in performing their duties; and as the services of a number of men specially qualified for retort-house work—such as stokers from steamers—had been secured, the productive power was rapidly increasing.

The week commencing on the 1st ult. opened with the brightest prospects for the Company's ultimate success. The first noticeable event was a renewed attempt on the part of the Directors to induce the stokers who had left to return; but it was not successful. The men declined to work with non-Unionists; and the Directors would on no account abandon the men who had been engaged during the crisis. Wishing to give the stokers every opportunity to resume work, the Directors advertised that as all the vacancies were not filled, the old hands who offered themselves for re-engagement would have priority over other applicants. In addition to the generally improved position at the Company's different works, offers of assistance were received from the Footscray Gas Company, who courteously placed the services of their Manager (Mr. Warren), a foreman, and 20 hands at the disposal of the Directors for relief duty for eight hours out of the 24 during the crisis. The Footscray Directors were determined that no effort on their part should be wanting to keep up the supply of gas. A similar spirit was manifested by the Australasian Gas Association, and other neighbouring Companies. There was a vast improvement in the evening. At the West Melbourne works, the three holders were nearly full; and there was a large quantity of gas available at each of the suburban stations. At the Collingwood works the production of gas at eleven o'clock at night was double that of Sunday. For the first time since the previous Thursday evening, the street lamps were lighted; and the residents of Collingwood, Fitzroy, and Carlton had a fairly good supply of gas. The Manager (Mr. Gray) was quite confident that by the following Wednesday he would be able to bring up the quality of the gas to what it was before the strike. As far, therefore, as productive power was concerned, there was little chance of failure; but the question of the supply of raw material had to be considered. This, however, did not cause alarm. There was actually in hand a month's stock of coal; and it was quite expected that before this was exhausted the general strike would be over.

There, for the present, the record of this important event in the history of gas supply in the Colonies must end; but it is only just that it should close with a recognition of the firmness and determination of the Directors, and the cordial co-operation of all the officials and loyal servants of the Gas Company, in successfully resisting an attempt at Trade Union terriorism.

A GAS MANAGER ON LABOUR TROUBLES IN NEW ZEALAND.

The Secretary of the Dunedin Suburban Gas Company, Limited, has recently received, at his London Offices, two reports, prepared by the Engineer (Mr. Wm. Daley), dealing with the general position of the concern at the close of June last. Embodied in these doucuments are some interesting remarks concerning the labour agitations in New Zealand, as far as they affect, directly or indirectly, the gas undertakings there; and, by the courtesy of the Secretary, we are enabled to give some extracts, which go to show that gas managers on the other side of the globe have had difficulties to battle with very similar to those which have disquieted managers at home.

The labour movements throughout the colony generally are causing, says Mr. Daley, a very considerable increase in the cost of everything all round; and it is becoming a most serious question as to how far the advance in prices will continue. As an example, the local lignite coal mine owners advanced (about the time the report was written, Aug. 16) the price of their coal by 2s. per ton, in consequence of the increased expenditure caused by Trades Unions; and this also applies to other trades. Just now Trades Unionism is rampant in New Zealand; but, according to Mr. Daley, there are signs of its being considerably modified before long. Until things become more settled, however, and the claims of Trade Unions are very much curtailed, it is impossible to say what contingencies will have to be faced, or what the results will be. In their demands, the Unionists display as much arrogance as their fellows at home, as the following incident will show. At the time the report was written, there was a dispute between a publishing firm at Christchurch and the Typographical Union, as to the employment of some half-a-dozen girls as compositors. The Union asked for their dismissal; and that men should be employed in their place. The firm refused to surrender to the Union; and as a result, the Committee of the Associated Unions intimated to the Railway Commissioners, the Union Steamship Company of New Zealand, and the other shipping companies that no goods for the firm were to be carried. Failing immediate compliance with this modest demand, the railway hands and seamen were all to be called out on strike, until it was agreed to. The Railway Commissioners, in an admirable letter, refused most emphatically to consider the matter. The idea of the Unionists appear to have been that, if they stopped the trade of the country, such pressure would have been brought to bear upon the firm in question by the other commercial houses, that they would have been compelled to give way. Unfortunately for the Unions, the commercial houses did their best in aiding to resist their demands. This shows to what extent the leaders of the labour party in New Zealand are prepared—or professedly prepared—to go, in order to enforce obedience to their wishes.

Mr. Daley has not been free from difficulty with his own men, as there was a Union formed (ostensibly for New Zealand, but really for the Dunedin City Gas-Works) of men employed in gas-works. The Agent and Committee of the Union tried to force Mr. Daley to employ three shifts of stokers, working eight hours each, at 8s. 6d. a day. He ascertained that the Society was not receiving that amount of support from the gas workers in other towns which they professed to have obtained, and he properly declined to fall in with their views. The old hands have been re-engaged for a year at the rate of £12 10s. per calendar month; each man being on duty twelve hours a day. The men are highly satisfied with their position and wages; and there is no reason why they should be forced to work under Union rules, seeing that these will not apply to works such as those of the Dunedin Suburban Gas Company.

The whole question of the coal supply in New Zealand, it appears, was most unsatisfactory at the date of the report; and it had been for some time a source of considerable anxiety and annoyance, not only to Mr. Daley, but also to the managers of all other gas companies in

New Zealand. Practically all the gas coal mines of New Zealand were then stopped. The Grey Valley Coal Company's mines had been closed, through troubles with the miners, for three or four weeks; and there seemed little chance of a settlement being come to between the proprietors and the men. At Westport the miners refused to work more than four days per week, and even then the output was being largely restricted. These labour agitations in connection with the West Coast coal mines have been brewing for some time past; and Mr. Daley was very glad to be able to purchase a cargo of coal in July. As a consequence, he had, when writing, sufficient coal on hand to last for three months; and he was hoping he should at least be able to continue to work regularly until the strike ended. While all the unsettled feeling existed prior to the strike, the supply of coal was of very inferior quality; but it was a case of taking what came, or none at all. With this inferior coal it was necessary, in order to maintain the quality and quantity of gas, to import, and use in conjunction with it, some of the New South Wales shale. This is, in fact, now done in most of the New Zealand gas-works.

Notwithstanding the difficulties under which Mr. Daley laboured, during the first half of this year, there was not a single complaint regarding the gas supply from any of the authorities of the four boroughs supplied by his Company; and the six months' working shows a substantial improvement over any corresponding period since the Company was formed. With regard to the future, Mr. Daley does not venture to predict what it will be like. The new-born Unionism has caused affairs generally to fall into such a disturbed state, that trade for the present is almost at a standstill. As an example of this, he refers to the Graymouth mines, which, at the time he wrote his reports, had been closed and the men out on strike for more than a month, and not a pound's worth of gas coal was then in the market. These are the principal mines from which gas coal is procured; so that there is a likelihood of this class of coal being dearer in New Zealand than it has ever been. When the labour agitation has subsided, Mr. Daley believes, so far as his Company are concerned, that there will be a rapid extension of business; and, judging from his reports, he is doing as much as he can individually to effect this.

PROPOSED EXTENSION OF THE BLACKPOOL GAS-WORKS.

Local Government Board Inquiry.

Last Thursday Mr. Arnold Taylor, one of the Inspectors of the Local Government Board, held an inquiry at Blackpool relative to an application of the Corporation for power to borrow £20,000 for gas-works purposes. The Town Clerk (Mr. T. Loftos) explained that the sum stated was required for various extensions and improvements. In the first place, they were proposing to spend £6000 in the erection of new retort-houses, £500 for extending the siding accommodation, £2800 for enlarging by two lifts the No. 1 gasholder, £500 for boiler and hydraulic machinery, £3000 for enlarging and replacing street-mains and for new mains, £800 for gas-meters, and £400 for street lamps and posts. A few interesting facts as to the history of the gas-works, the present progress, and the increased accommodation which they had to provide from time to time, were then given by the Engineer (Mr. J. Chew). He said that in 1879 the number of cubic feet of gas made was 46,012,000; and the price charged was 3s. 9d. per 1000 feet, although they possessed power to charge 4s. 6d. Last year they produced 145,000,000 cubic feet; but this year it was expected that 150,000,000 feet would be manufactured. The price was now 2s. 6d.; and the fact of it being so low, he thought, tended towards an increased consumption. The average illuminating power of the gas supplied was 18·4 candles. Since 1879 there had been handed over from gas revenue to the Corporation for town's purposes the sum of £40,370; and if they had kept the price of gas up to 3s. 9d. per 1000 feet, they would have been enabled to hand over a further amount of £40,016. During the period the gas-works had been in existence, something like £60,000 had been spent upon them. Referring to the consumption of gas by stoves, Mr. Chew remarked that he did not think there was a town in the United Kingdom in proportion to its size, where gas-stoves were so extensively used as in Blackpool. The proceedings concluded with the usual vote of thanks to the Inspector.

The Lighting Question at Woking.—Another meeting has been held at Woking to consider the advisability of lighting a portion of the district. It will be remembered that two or three weeks ago it was decided at a public meeting to adopt the Act relating to the lighting of parishes. A poll was demanded; but on account of the number of the inspectors not being settled at the meeting, the proceedings had to commence *de novo*. There was a great deal of small talk at the last meeting; and on the motion for the adoption of the Act being put, it was lost by two votes. Proceedings for acquiring power to light the district under the Act cannot now be taken for a twelvemonth.

Northern Coal Trade.—There is easiness this week in the coal trade in the north, due to several causes. The closing of iron-works in Scotland has thrown a large quantity of coal on the market; and at this time of the year there is usually a falling off in the shipments to the Baltic. Steam coal has been quoted a little lower—at about 12s. 6d. for best Northumbrian coal. For second qualities, about 11s. to 11s. 6d. is the current price; and for small steam, 6s. 6d.—free on board in each case. Gas coal is steady, though one or two of the collieries have been much in need of steamships for the London trade. About 11s. to 11s. 6d. is the price, and there is now a fair production, whilst the local consumption is very satisfactorily increasing, remembering the fine weather. Household coal is in dull demand for this season of the year, for the reason just assigned. Coal for the use of steamships is also easier. Manufacturing coal sells freely; and many of the contracts for next year are now under negotiation. In the coke trade, there is a better request for blast furnace coke, both for local use and for shipment; and the price has advanced to about 18s. 6d. free on board, for delivery over the rest of the year—a price which has been paid in a few instances. There is no alteration in gas coke; but there is now a larger supply than in the summer months. It is, however, well taken up,

LEICESTER CORPORATION GAS AND WATER SUPPLY.

Half-Yearly Financial Statements—The Question of Meter-Rents.

At the Quarterly Meeting of the Leicester Town Council on Tuesday week—the Mayor (Mr. Alderman Lankester) in the chair—the reports of the Gas and Water Committees, for the six months ending June 30 last, were presented.

The Gas Committee reported that the accounts of the undertaking under their charge showed a net profit, after paying interest on capital, of £15,941 9s. 9d. Out of this there had been paid £2762, the half-year's amount of the sinking fund; leaving a balance of £13,179 9s. 9d. to be applied at the end of the official year (March 25 next) as the Council might direct. The accounts included the result of the working of the residual products department and the gas-fitting business. The net amount realized by the former was £8742 12s.; and the half-year's working of the latter showed a net profit of £358 15s. 11d. During the half year 45,165 tons of coal were carbonized. The quantity of gas made was 463,158,000 cubic feet, as compared with 450,370,000 cubic feet in the corresponding half of last year; being an increase of 12,788,000 cubic feet, or 2·83 per cent. The Committee further reported that the extensions at the Aylestone Road works were drawing towards completion. It was anticipated that the manufacture of gas would be commenced in the second section early in November. The new purifying apparatus was put into operation at the beginning of August last, and was working in a satisfactory manner. Subject to the approval of the Council, the Committee had purchased the warehouse, offices, and premises at the corner of Market Street and Millstone Lane, and adjoining the present Gas Offices, for £8500. The site of the whole of the premises contained about 499 square yards. The property being contiguous to the central offices and premises of the Gas Department, rendered its acquisition desirable; and the Committee believed the price to be fair and reasonable.

Mr. Lennard, in moving the adoption of the financial portions of the report, said for the first time for many years they had had a turn in the tide of the profits of the department, inasmuch as there was a small decrease as compared with the corresponding half of last year. The revenue account was the most interesting and vital portion of the financial statement; and it would be seen therefrom that the total revenue for the past six months was £73,392 4s. 11d. For the corresponding half of last year the figure was £67,157; so that they had an increased revenue of £6235. Of this £1780 was due to the larger sale of gas, which, as the report showed, amounted to about 3 per cent. The rental of meters and stoves yielded practically the same as formerly; but the residual products, he was glad to say, exhibited a very handsome increase. For coke and breeze they had the sum of £9923 19s. 4d., as against £7160; showing a rise of £2763. This was largely owing to the excellent price they were enabled to get for their coke during the period to which the accounts referred. Prices had not since then been quite so good, as the high rates for fuel, after the fall in the value of iron, had compelled many of the owners of blast furnaces to put them out. The prices of coke had gone down somewhat in consequence. For tar and ammoniacal liquor they had received £8742 12s., against £7225—an increase of £1517. In the gas-fitting department they had made a profit of £358 15s. 11d. These were the main items on that side of the balance-sheet. He would like to explain that the sum of £73,392 4s. 9d. did not show the total returns of the department for the half year. The accounts were made out according to the Government plan, to which all corporations had to conform; so that with regard to residual products the amount stated was what they had received, less charges for interest and labour, and, in fact, charges of every kind connected with their residuals. The same applied to the gas-fitting department. They only just showed the net profit, and not all the transactions. The whole turnover in the gas-fitting department was considerably more than £4000. The total return for the entire department during the half year was something like £90,000, or £180,000 for the whole year. Turning to the other side of the balance-sheet, there was an item of £24,040 for coal, which was an increase of £3830. The coal they had used for the period represented was bought 18 months ago; and since then there had been one or two rather stiff rises in price. Another considerable item which had been increased was that of wages for carbonization—viz., £5179, as compared with £4755 for the corresponding half of last year, or an increase of £424. This practically represented the increased wages of the stokers for the six months. The Council would remember that, during the period when there was considerable agitation throughout the country among gas stokers, they very quietly and amicably settled any ideas there might have been among some that they would have a disturbance. They raised the wages of their stokers something like 6d. a day, which meant £1000 per annum. Since then they had increased the wages of another class of the men in connection with the gas-works—viz., the labourers—by about 20 per cent., which would amount to another £1000. They felt they were justified in making these advances, not only because of the great demand for labour throughout the country, and what was being done elsewhere, but also because they thought the condition of the balance-sheet would well allow it. With regard to the repairs and maintenance of works, there was the rather large item of £6060, as against £4417 for the corresponding half of last year; the increase being £1643. In considering these figures, it was well to see whether the works were being kept in good repair. He was glad to say that they were being maintained in a high state of efficiency, and also that the distributing plant was in a most satisfactory condition, as was shown by the small amount of unaccounted-for gas. It was gratifying to know they still stood among the first in the country on this point; their leakage being less than 3 per cent., while the average throughout the country was about 7 per cent. The total expenditure for the half year was £45,222, as against £39,502 in the corresponding period of last year—an increase of £5720. This brought the total gross profit to £28,170 3s. 4d.; and after paying interest, sinking fund, and other charges, they had £15,941 9s. 9d. as net profit. Out of this they had the half-year's sinking fund to pay; leaving a net balance at the disposal of the Council of £13,179 9s. 9d., or £197 17s. 8d. less than in the corresponding period of last year. He was quite sure the Council would

feel with him that, under all the circumstances—the increased cost of materials, the state of the labour market, and the wages—this was a very favourable balance-sheet to be able to place before them. In many large towns—in London, Nottingham, Leeds, &c.—the price of gas had been raised from 3d. to 5d. per 1000 cubic feet, in order to meet the same difficulties that they had had to face at Leicester. When he last addressed the Council on the subject, he estimated that they might possibly have to pay a very large amount more for coals in their contracts of last May. Although there seemed to be an aim on the part of a "ring" of colliery proprietors to obtain a large advance on what had hitherto been paid, the Committee managed, by private negotiations—by pitting one owner against the other—to get their coals at a very moderate advance indeed; so that he had not the pessimistic views of their next balance-sheet that he had when he last addressed them. But this had been brought about only by the study of economy in the working of the details of the department in every particular. With regard to the general balance-sheet, the only item he could refer to was the value of the stock. It would be easy to produce an account showing a profit, if they did not mind how they took stock. Having personally gone through the items with the Engineer (Mr. A. Colson, M. Inst. C.E.), he could vouch that the stock was well worth the money at which it was put down, and there need be no apprehension on the part of the Council that it was not in favour of the department. With regard to the capital account, the amount remaining to be borrowed was said to be £11,400. That was on the 30th of June last; and before another week had passed there was nothing left. At present every penny of the money authorized by Parliament to be used by the department had been borrowed. They had only £3000 or £4000 unspent; and the question had been considered by the Committee several times of late, what they should do for further capital. They were not yet in a position to report what they would like to do; but it should not be forgotten that the whole of the capital had been called up. The sum of £1314 had been laid out on new mains and services. During the past half year the whole of the distributing plant had been kept well repair; and if there was any district not likely to get an ample supply of gas on account of its growth, the Committee at once took up the mains and replaced them with others of sufficient size. The sulphur compounds in the gas, during the past few months, had ranged only from 11 to 15 grains per 100 cubic feet; while in London the summer minimum allowed was 17 grains. He was pleased to say that he believed the Engineer and staff, and the whole of the workmen from top to bottom, were doing their very best for the interests of the department. The Committee had given very careful consideration to the work and its details; and he thought that in the report they had a very satisfactory result.

Mr. HARVEY seconded the motion, and it was carried.

Mr. LENNARD next moved the adoption of that part of the report relating to the purchase of the property at the corner of Market Street and Millstone Lane. He remarked that when this property was acquired and added to the present offices, they would have an exceedingly fine block of buildings. The Council, of course, would want to know what they contemplated doing with it. They all knew what the Committee had been doing at Aylestone Road. Their present production of gas was about 4½ million cubic feet per day; and when they had completed their works, they would be able to turn out 9 millions, or something like double. They had heard from time to time that they would require the whole of these works in all probability in about ten years' time. They would have half of the new section in operation in November; if not, they would not be able to supply the town, because in the dark days of December between 5 and 6 million cubic feet of gas were required for lighting it. They could not supply this from the present works; so that they had the extension only just in time. Further development would take place; and already the offices were far too small for doing the work comfortably and well. What would they be when Leicester had grown, and the business had reached twice its present magnitude. He did not say that they would require to double their office room when they doubled the manufacture; but they would want 50 or 60 per cent. more, and at present they had not enough. In conclusion, he would remind the Council that, not only would their gas business grow, but they were committed to the introduction of the electric light. Whether they produced the electricity themselves, or entrusted it to a company, that was the place for the offices, next to those of the Gas Department, because they would work much more economically if they were together in one block of buildings.

Mr. BRUIN seconded the motion, which was supported by Alderman WOOD, and carried.

Mr. LENNARD next moved the adoption of the remainder of the report; and this was agreed to.

Alderman WOOD afterwards submitted the report of the Water Committee, which stated that there was a net profit of £7245 10s. 6d. on the working of the undertaking for the past six months. Out of this sum £1973 had been paid into the sinking fund; leaving a balance of £5272 10s. 6d. In moving the adoption of the report, he said the profits would have amounted to £400 more, but for the fact that certain expenses in connection with the water-rate not properly chargeable to capital were put on the revenue. The average consumption of water per head per day supplied for all purposes was 18·22 gallons, divided as follows: Domestic purposes, 12·81 gallons per head; trade purposes, 5·41 gallons per head. This was an increase on the corresponding half of last year, and was due probably to the lavish way in which the water had been used in the streets.

Mr. COLEMAN seconded the motion, and it was carried.

At a subsequent stage of the proceedings,

Mr. BREMNER moved the following resolution, of which he had given notice: "That, having regard to the large profits made by the Leicester Corporation Gas Department, this Council is of opinion that all gas-meter rents should be abolished." He said the question had already been before the Council; but, whatever might be the issue of the present discussion, no one could contradict him when he said that a very strong feeling existed, both within and outside the Council, in favour of the abolition of these rents. As he was a member of the Gas Committee, he might be asked why he did not bring the question before that Committee and have it settled there. His answer was that he had introduced it, but the Committee had not settled it; and therefore he felt obliged to bring it before the Council. A step in the right direction was taken two years ago, when Alderman Wood moved, and it was agreed, that the rent of three-light meters should be reduced from 1s. to 8d. per quarter. A certain modified relief was thus afforded to the very smallest consumers. No one could deny that the Gas Department of the Corporation was eminently prosperous; and it owed its success largely to the able management of the present and past Chairmen of the Committee, and to the foresight and skill, both commercial and scientific, of Mr. Colson, whom he did not hesitate to characterize as one of the best gas engineers in the country. But, making all proper allowance for this, he asked from whom the large profits had been derived. The obvious answer was that they came from the consumers, who should therefore be conciliated by every means in the Committee's power. For the first four years that the Council had the gas-works, the profits were never less than £11,000; and for the last five years the figures were: For 1885, £15,000; 1886, £18,000; 1887, £20,000; 1888, £26,000; and in 1889, the grand total of £30,000, For 10¾ years, £223,000 had been employed in the relief of the rates; and yet this wealthy Corporation continued to impose charges for meters on hundreds of poor people. The result was that many of the smallest consumers of gas had to pay practically 50 per cent. more for their gas than the large consumers; while in many cases the amount of the gas bill and the rent of the meter came to very much the same figures. He was aware that the financial side of the question was the difficulty; but he had never seen any very insuperable obstacle to putting the matter straight. He had heard it argued that the gas-meter was part of the fittings of a house; but he contended that this was not so. It was a system of measurement to register the amount of gas supplied by the Corporation to a consumer; and it was employed to enable the Corporation to make out their quarterly bills against their customers. The meter was put up in the interest of the Corporation; and yet they made the consumer pay not only for the gas, but for the instrument by which it was measured. He had with him a gas bill, in which 8d. was charged for 300 cubic feet of gas consumed during the quarter, and 1s. for the use of the meter during this period. Could anything be more absurd? He had heard the simile used that this was like a grocer charging a customer a 1s. for the use of the scales to weigh 1lb. of cheese, value 8d., which he had purchased. By reducing the rent from 1s. to 8d. per quarter, the Council admitted that it was wrong in principle—(No, no)—or at least it must mean that they had been charging too much. He maintained, however, that it was wrong in principle, and pressed hardly on the small consumer. It was also unfair to the large consumer, because the better consumer he was the higher rent he had to pay for his meter.

Mr. GIBBS seconded the motion.

Mr. LENNARD said that three months ago he asked the Gas Committee if they would like to have the meter-rent question discussed. The members then present felt that they were in a transition state financially, and could not face the proposed change; and they did not want to deal with the question until they could finally settle it. It was then decided that the question should be deferred until after the next balance-sheet had been presented. The minutes of that meeting were passed without opposition at the succeeding meeting; but on neither occasion was Mr. Bremner present. It was unfortunate that he should not have been there to know why the Committee resolved to defer the subject. Dealing with the arguments for and against the proposal, he said that, in consequence of the large profits, they had made three material reductions in the price of gas to all the consumers. This was the only way in which they could deal equitably with the profits. If they abolished the meter-rents, a man might pay £500 a year for gas and be relieved only to the extent of about 1s. a quarter; while one who used 8d. worth might be relieved almost to the same amount. This would not be equitable. The very small consumers were a loss to the Gas Department. No profit was derived from a consumer until he had used 6000 or 7000 cubic feet of gas; and because they were such bad consumers, and absorbed the profit, they were, according to the proposal before them, to grant them the use of the meters for nothing. They wanted to deal equitably with all alike. Mr. Bremner had not touched the law of the question, nor the general practice of the country; neither had he given them an alternative, nor shown what would be the consequence to the Gas Department and the Council if the meter-rents were now abolished. If he had gone thoroughly into the question, he would not have proposed the resolution in the way he had done. If they adopted it, it would entail a loss of £5000 a year to the Gas Department; and at present they were not prepared to sacrifice this amount in order to satisfy small consumers who contributed none of the profits. It would also cause an injustice to those who had meters of their own. As to the custom, there were only three places where no meter rent was charged. In Glasgow there were special reasons for it; but there the cost was added to the price of the gas. In Birmingham, small consumers were charged 4d. per 1000 cubic feet more than the large ones; and at Bradford, the Gas Committee imposed a limit of 2000 feet of gas which had to be paid for, so as to ensure a profit from it equal to the meter rent. There also they sold meters to the poorer consumers; and he held that the result was tenfold heavier upon them than the custom of charging a rent. Further, there were 44 tradesmen in the town who sold meters; and if the Council gave them away they would rob these tradesmen of their business. He held that the first benefit of the meter was the protection of the consumer, and it was better to allow him to pay 8d. per quarter than to make him invest 25s. all at once. They had no right to allow any consumer to use a thing for his own benefit without paying for it; and the poor people did not care for that kind of charity, but were willing to pay the same as the large buyers. On no grounds had Mr. Bremner made out a case why they should disturb the present arrangement. He (Mr. Lennard) admitted that they ought not to make an exorbitant profit out of the meters. A charge of 6d. per quarter would pay them 5 per cent. interest; and he should be prepared to propose after the presentation of the next balance-sheet, that they should not make more than 5 per cent. interest on the meters. Then, when a reduction was to be made from the profits, let all share alike according to their contributions to the

exchequer. He moved, as an amendment, that the question should be left in the hands of the Gas Committee.

Alderman KEMPSON seconded the amendment.

Mr. BIGGS argued that Mr. Lennard had shown that some alteration was necessary because the large consumers were now taxed for the benefit of the small ones. The profits had gone on increasing; and he submitted that the present was the time to make the change, as the Gas Committee would not be in a humour to do so if their profits went down to £8000 or £10,000. He thought the justice of the thing might be met by fixing a minimum sum to be paid for the gas.

Alderman WOOD said the Gas Committee had always had the keenest interest in the small consumers; but they were the most difficult they had to deal with. The collectors had frequently to go six, seven, or eight times for an account amounting to probably less than 2s.; and often, a few weeks after an expense of 3s. or 4s. had been incurred in putting in a meter, the tenant sent to say he was removing. He (Alderman Wood) knew from experience that the small accounts were most unprofitable, and that they lost considerably by supplying gas to the majority of the cottage occupiers. If they would only do more cooking by gas, the meter question would be a very simple one. The Committee were as anxious as Mr. Bremner to deal with the question; but, in the face of their many difficulties, was it opportune or reasonable to ask the Council to face a loss to the extent of £3000 to £5000 per annum?

Mr. BREMNER having replied, both the motion and the amendment were withdrawn, on the understanding that the question should be considered and settled next March.

THE WATER-GAS EXPERIMENT AT HARROGATE.

The letter by Mr. Wesley Petty on the above subject published in the *Leeds Mercury*, and the substance of which was given in the JOURNAL last week (p. 757), called forth a reply in our contemporary from someone signing himself "A Harrogate Ratepayer." His statement, however, would have carried much more weight if he had, like the writer of the letter whose assertions he sought to refute, placed his proper name and address at the foot of his communication.

He says Mr. Petty's facts, as stated in his letter, prove conclusively that he knows nothing whatever of the subject he writes about. As to the first fact, he asserts that less than one-fourth the number of affidavits named were filed in the action referred to, as against the use of water gas, and many of these, he believes, emanated from interested sources. On the other hand, more than four times the number of affidavits from some of the most influential local residents deny point-blank the statement made against the experiment; and it is quite true that a petition was presented to the Corporation by a number of tradesmen for the extension of water-gas lighting into other streets. He avers that he knows, from the most reliable authority, that many corporations and local boards are now closely investigating and negotiating for the adoption of water gas for lighting and other purposes, very largely originating from their seeing the plant and gas in use at Harrogate. With regard to Mr. Petty's second fact, it is alleged that the quantity of water gas consumed in each lamp is fully 50 per per cent. less than the amount stated in his letter. Respecting his third fact, that the Water-Gas Company admitted the cost to be 1s. 4d. per 1000 feet at the burner, this statement says the "Harrogate Ratepayer" is incapable of proof, as eminent authorities, including Sir H. Roscoe, Sir Douglas Fox, and others, have proved the cost to be much less than half that price. The letter concludes: "As a resident ratepayer in Harrogate, I am of opinion that our worthy Mayor has done the borough considerable good by introducing this water-gas illumination in Parliament Street; and I am convinced that the general wish of my neighbours and the visitors is to see this water-gas illumination extended through the town." A rejoinder came from Mr. Petty the day following the publication of this letter, in the course of which he says, referring to the number of affidavits supporting the injunction now pending against the water-gas plant, it is probable that "A Harrogate Ratepayer" is in ignorance of the number received since the first batch of fifteen were filed some weeks ago. The protection of health and business is surely as honourable a reason as that which may be actuating "influential people" to appear on behalf of the Water-Gas Syndicate. The petition from some of the James Street tradesmen to have water-gas lighting, he remarks, chiefly arises, according to their own testimony, from a desire to share with their competitors in Parliament Street in the free advertising so extensively undertaken at the expense of the Water-Gas Syndicate. In regard to the quantity of gas consumed, Mr. Petty has tested the Bray No. 3 burners, two of which are used in each of the water-gas lamps, surmounted by delicate magnesian combs. With the Harrogate pressure, which is very low compared with larger towns, they each consume 10 cubic feet, while the old gas-lamps burned 5 feet; so that, in his first letter, Mr. Petty was under the mark, and not over. On the question of the cost of water gas, Mr. Petty observes: "My authority is the JOURNAL OF GAS LIGHTING. That paper recently sent a representative to Harrogate, who, in the course of an unbiassed report, says, that after viewing the plant he was told 'on authority' that the water gas cost 1s. 4d. per 1000 cubic feet at the 'burner when consumed on premises contiguous to the place of manufacture." Referring to "many Corporations" who are said to be "now negotiating" for lighting their town by water gas after seeing the plant at Harrogate, Mr. Petty remarks that "it is well known that the Syndicate have spared no expense in bringing officials from other towns to view their lighting. A general unsigned statement that these towns are now prepared to adopt the same, will be received with some reserve where names and instances are withheld." The "Harrogate Ratepayer," in a further communication, says that this letter confirms what he previously pointed out—that the supposed facts Mr. Petty gave were not his own, but repeated from other sources whose interest it was to oppose all water-gas experiments. "Ratepayer" adhered to his former statement; and on the question of the cost of water gas, he wrote as follows: "Here Mr. Petty let the cat out of the bag. His authority is the JOURNAL OF GAS LIGHTING—a fact which proves that Mr. Petty is but a tool in the hands of the enemies of water gas. The most I gave in my last letter was on the independent testimony of Sir Henry Roscoe and Sir Douglas Fox. No such figure as he names was given to anybody from the water-gas authorities." "Another correspondent, under the *nom de plume* of "Coal Gas," asserts that the remarks of Mr. Petty as to the cost of coal gas are erroneous; and if allowed to remain uncontradicted are sure to do much harm to gas shareholders. "Taking the last yearly accounts of the company for my guide, I find," says "Coal Gas," "the number of tons of coal carbonized are 8600, and the quantity of gas sold 82,920,000 cubic feet, or an average of 9642 feet per ton; the cost per 1000 feet running out as follows: Manufacture, including coal, purification, wages, and repairs of works, 2s. 0·034d.; distribution, including salaries, repairs of pipes and meters, 2·083d.; rates and taxes, 1·027d.; management, including collection, directors' salaries, and general establishment charges, 2·571d.; bad debts, 0·051d.—total gross cost per 1000 feet of gas sold, 2s. 5·766d. Subtract from this the amounts received for meter-rents, &c., and residuals, and you have the exact net cost. They are: Coke, 8·550d.; tar, 1·144d.; ammoniacal liquor, 1·055d.; meter-rents, &c., 4·041d.—total, 1s. 2·790d. The net cost of gas, therefore, is 1s. 2·976d., or a profit of 1s. 10·642d. for every 1000 feet sold. If Mr. Petty will kindly give me the number of cubic feet made on the works for the above period, I will give him the figures in 1000 feet of gas made; the difference between gas made and gas sold being, of course, in the leakage, and cannot possibly in this instance amount to much beyond one penny."

CANTERBURY GAS AND WATER COMPANY.

The Canterbury Corporation and the Company's Bill.—Increase in the Price of Gas.

In the JOURNAL a fortnight ago we alluded briefly to the special meeting of the Canterbury Gas and Water Company on the previous Thursday, at which authority was given to raise further capital for the purposes of the undertaking. As negotiations were on foot a few months ago for the purchase of the Company's works by the Corporation (a project which eventually fell through), and as the Company have lately obtained further parliamentary powers, a few extracts from the remarks of the Chairman—Mr. G. Furley—on these matters may be of interest.

The CHAIRMAN commenced by reminding the shareholders that a meeting was held in January last for the special purpose of obtaining their consent to the Bill which had since passed through Parliament. At that time, or just before the meeting, a proposal was made by the Town Council to purchase the Company's undertaking. This proposal came upon the Directors as a great surprise; but the question was fairly entertained, and at a meeting they had with the Committee appointed by the Town Council the general terms were agreed upon. These were adopted by the Council at a special meeting called for the purpose; and when this was done, they entered on what they regarded as a fair and proper course for carrying it out. He need hardly say this was a matter of great anxiety to the Directors. They carefully considered it, and incurred very large expense in having the opinion of experts on the question, and in protecting the interests of the concern. An agreement was prepared and sent to the Council; and they very soon returned it with an intimation that they declined to purchase. Personally, he believed it was a very good thing they did decline, and that the Company still retained the power to work and improve the gas and water supply of the city. Before these meetings were concluded, the Council presented a petition against the Bill. The most bitter opponent of the Company could not have formulated a stronger petition, as it embraced almost every point on which they wished to have the opinion of Parliament. The effect of this was that the Directors had to prepare for a vigorous fight in Parliament in favour of their proposals; because, although he had expressed the readiness of the Directors to meet the representatives of the Council and discuss the questions at issue, no evidence was given by the other parties of a desire to do so until all the expense of a contest had been incurred, and then a meeting was suggested. The Directors felt that they could not then settle the matter, and that it would be far better to fight it in Parliament. They went into Committee with their Bill, and they came out with it; and he thought when he stated the advantages they had gained, the shareholders would say they had done so with very fair colours. In the first place, their gas capital was entirely exhausted; their account at the bank was overdrawn; and they could not go on with any work of extension. Well, the Committee granted to them new gas capital to the extent of £36,000, with borrowing powers of £9000 upon that capital. With regard to the water, they gave them fresh capital of £15,000, with borrowing powers to the extent of £3750 upon it; and if the shareholders would add £12,500 which they had not spent of the water loan capital, they would find they had now new capital to the extent of £72,250 for the further use of the Company. They had also the sliding scale, by which they could increase their dividends so long as the price of gas was not raised beyond 3s. 6d. per 1000 cubic feet. As to the question of the dividends to be paid on the old and new capital, the Committee gave them the same amount for the latter as for the former. They lost the electric light clause, which was to give them power to go to the Board of Trade, supposing they wished to introduce electricity, to apply for a Provisional Order for this purpose. He thought it was a good thing that the clause was struck out. He was never in favour of the supply of electricity being added to the business of the Company. He did not think Canterbury was the place for electricity; and he was afraid it would not shine as regards dividends. He considered it was better left alone; and he was justified in that opinion, because he had lately read that power had been granted to a gas company to supply electricity in a district, but it was on condition that the capital, and the profits also, should be kept distinct. The standard price for gas had been reduced by the Committee from 3s. 6d. to 3s. 4d.; as compared with 4s. 6d. in their Act of 1886. If the Council had meet them, as had been offered, the Directors would have been

prepared to put the figure lower than the one the Committee had fixed. With regard to the Company's business, he regretted to say that, owing to the strikes and the extra cost of coal, the Directors had been compelled to raise the price of gas from 2s. 10d., to which they had worked down, to 3s. 1d. per 1000 cubic feet. In their former contract for coals, the cost was 13s. 3d. per ton. A few days previously they had to enter into a fresh contract at 18s. 6d. per ton—a difference of 5s. 3d. This meant £2887 a year. The Directors found that an increase of 3d. per 1000 feet would enable them to "make both ends meet" next year. It gave them £1224; but, of course, this was not sufficient for the £2887 extra expense. They had fortunately some unappropriated profit floating about; and from this they could take enough to make up the dividend. They had for some years past more profit than they really wanted; but they had never been able to make any alteration in the price of gas. This money had accumulated. They had put it aside to a depreciation fund, which amounted to some £2000. This sum in strictness they had no right to part with; it ought to have remained in the general floating balances of the concern. That was one of the things which the Town Council "spotted." They said the Directors had no right to it, and that they must strike it out; and it was arranged that the £2000 should go to capital for which no dividend should be allowed. Look at the result. If the Council had allowed the £2000 to remain as it was in their accounts, they would have been able to take the £2000 back into the unappropriated profit account, for the purpose of paying the difference in the price of coals, This action on the part of the Council had cost the gas consumers of Canterbury for this year alone no less a sum than £1224. The Chairman then passed on to deal fully with the special objects for which the meeting was called.

LEEDS COUNTY COUNCIL AND ELECTRIC LIGHTING.

The Members favour Private Enterprise.

A Special Meeting of the Leeds County Council was held yesterday week—the MAYOR (Mr. Alderman Emsley) in the chair—to consider a report by the Electric Lighting Committee. The report detailed what has been done in other countries and towns in England, and continued in the following terms: As compared with the charges for gas, the calculation set out in the previous report still remains good. It may be taken generally that, for a large area, a corporation can supply the electric light at the rate of ½d. per 10-candle power lamp per hour, which is equivalent to gaslight at 3s. 5d. per 1000 cubic feet. As to the advantages of electric lighting from a health point of view, it has been stated that, in one Government Department alone, no less than £600 per annum is saved through diminished absence of clerks and others arising from sickness. Having now given, with as little elaborate detail as possible, information which the Council desired to have supplied, the Committee have to consider what course ought to be adopted as regards a public supply of electric lighting for Leeds. With absolute unanimity and strong conviction, the Committee are of opinion that any further delay in providing the electric light for general use would be to deprive Leeds of an illuminant possessing great advantages over every other mode of lighting, especially from a sanitary point of view. In the Committee's previous report, it was recommended that the Council should provide and supply electricity for public and private lighting. The chief advantages of this would be that the light could be supplied at about one-half the price now charged by a private company, and that control over the public highways would be retained by the Corporation. To these must be added the advantage of being already in possession of an installation from which the Corporate buildings are successfully lighted. It is, however, contended by many persons that if two or three electric lighting companies are permitted to supply different parts of the borough, competition for business would reduce the charge for lighting to the lowest paying point. Practically, however, there would be no competition, because more than one company would not provide light in the same district; and if different companies having different systems of lighting are permitted to occupy the borough, much difficulty and increased expense must ensue when the Corporation think fit to take possession of the property. The one system having very marked advantages for a large and wide borough like Leeds is, in the opinion of the Committee, the high-potential alternate-current system, by which the whole of Leeds could be well lighted from one central station.

Mr. HARDWICK, in moving the adoption of the report, pointed out that the Council would have to take one of two lines of action—either put down an electric installation themselves, or allow a company to do it. Although he moved the adoption of the report as the Chairman of the Committee, he was not tied to it, and was not very particular which of the two schemes the Council adopted. If they undertook the work themselves, they would have the advantage of borrowing money cheaply, and would have no directors or chairmen of committees to pay. But a company would have a greater interest in making the venture a success than the Corporation could possibly have; and personally he was in favour of a company undertaking the work.

Mr. WILLEY seconded the motion, and expressed his surprise at the "vague" and "confused" way in which the matter had been brought before the Council by Mr. Hardwick. He hoped the members had come prepared to give a vote on the question. Electric lighting had reached the point when it could be produced at a paying price; and it was superior to gas. There was one system pre-eminent over all others; and that was the high potential, by which a large area could be supplied from one centre, and the larger the area, the smaller the cost of production. The Committee were unanimous in agreeing that this was the system to adopt if any was fixed upon. He also spoke in favour of allowing a private company to supply the light.

Alderman SCARR said he considered it was not advisable to have an installation of the electric light carried on by a Committee of the Corporation. In the Council Chamber it required an 8-horse power engine to light it; what horse-power, therefore, would be needed to light the whole borough? (Voices: "That's common sense.") They had often made a mistake in the Corporation going in for a thing they did not understand; and he did not wish them to repeat it. He was not afraid of allowing a company to come into the town, and did not care what they paid so long as the people obtained the benefit.

Alderman SPARK said he was positively amazed that there were gentlemen present who could speak of the electric light in the way Alderman Scarr had done. There were companies who would be only too ready to come into Leeds and supply the light; but for the benefit of themselves. Electric lighting companies, notwithstanding the short time they had been in existence, were making considerable profits; and there were no fewer than 255 applications being made by them to lay down installations in different towns. In the neighbouring town of Bradford, Alderman Priestman had stated that the Corporation had been offered a profit of £10,000 for their undertaking.

Mr. BATTLE moved, as an amendment—"That it is not desirable for the Corporation itself to supply electricity for public and private lighting purposes, as, in the opinion of this Council, such supply can be advantageously provided by private enterprise."

Mr. COOKE seconded the amendment.

After further discussion, the vote was taken, when 35 members were in favour of the amendment; and only 4 supported the recommendation of the Committee.

THE ELECTRIC LIGHT QUESTION AT BARNSLEY.

For nearly four hours last Tuesday, the members of the Barnsley Town Council were discussing the question of the proposed electric lighting installation for the borough. The minutes of the Park and Lighting Committee stated that they had visited London, and had issued a supplementary report, in which they recommended the appointment of Mr. Bromley Holmes as electrical engineer during the construction of the electric lighting plant, and also for three months after its completion. On the other hand, Mr. J. H. Bailey had a notice on the *agenda* to the effect that no further communication be made to the Westinghouse Electric Company respecting their tender, until the Committee had thoroughly investigated for themselves the relative advantages of the different electric lighting systems now in more general use, and reported the result of their inquiries to the Council. Alderman Blackburn moved the adoption of the report; and urged the Council to accept the Westinghouse Company's contract, and let the business be proceeded with as expeditiously as possible. In the course of his remarks, it transpired that Mr. Holmes's fee would be 200 guineas, with hotel expenses. Mr. Sykes seconded the motion; and then Mr. J. H. Bailey asked, among other things, why the Committee in their first report recommended a low-tension system and in the second a high-tension one. Alderman Blackburn admitted that they primarily recommerded a low-tension system, but their after-experience convinced them that that system would die out. With regard to an inquiry as to the working expenses, he confessed he could not give them, as he had not gone into every minute detail. They were advised by the Westinghouse Company that their arc light was the best in the market, and would burn 40 hours. Mr. Bailey then moved his motion as an amendment. The Committee had, he said, recommended a system they had never seen, and had not used their own judgment. He believed the Committee were on the wrong track, and that they had not gone into details; and he spoke in favour of the adoption of the Thompson-Houston system. Mr. Halton seconded the amendment. Mr. Tyas said it appeared to him that three of the tenders sent in had not been considered, and were put on one side. This was unfair to the companies, which had been misled by the conditions laid down in the particulars supplied. He believed the Westinghouse Company had been allowed to alter their tender. If they had a right to do so, the other companies lower down the list ought also to have been permitted to modify theirs. Mr. Wray entreated the Council to remain firm, and support the Committee's recommendations, and Mr. Waddington made a similar appeal, reminding the members that 75 per cent. of them had already recorded their votes in favour of adopting the Westinghouse Company's tender. In the result, seven members voted for the amendment, and eleven for the motion.

The Electric Light at Nelson.—The Nelson Local Board have decided to lay an underground cable sufficient for an installation of 600 electric lights. The price of gas in Nelson is 2s. 6d. per 1000 cubic feet; and it is announced that the cost of the electric light will about equal gas at 4s. 6d.

Sale of a West Cumberland Colliery.—The Dovenby Colliery, situated near the Limefoot Station on the Derwent Railway, has been sold by Messrs. Harris, of Cockermouth, to Messrs. J. and W. Wood, large colliery-owners in Scotland, who have offices in London, Liverpool, and Glasgow. Messrs. Wood intend to extend the workings of the Brassie seam; and are making arrangements which will enable them to increase very considerably the output from the colliery.

Issue of Small Amounts of Stock by the South Metropolitan Gas Company.—According to a paragraph which appeared in several of the London papers last Tuesday, the Directors of the South Metropolitan Gas Company, following the example of the Treasury, have offered to issue to their consumers small amounts of stock of not less than £5 nominal value. The "C" stock is offered in this form at the rate of £242 per £100 of stock; and, at the present rate of dividend, it will yield close upon 5 per cent.

Awards at the Edinburgh International Exhibition.—The official list of awards at the Edinburgh Exhibition was issued last Friday. In the complimentary list of exhibitors, gold medals were awarded to Messrs. J. E. H. Andrew and Co., of Reddish, for a 16-horse power double-acting gas-engine, and to Messrs. Priestman Bros., of Holderness Foundry, Hull, for their petroleum engine. In the general list of exhibitors, Messrs. Crossley Bros., Limited, of Openshaw, Manchester, received a diploma of honour for gas-engines; a gold medal was awarded to Messrs. Fielding and Platt, of the Atlas Iron-Works, Gloucester, for a gas-engine; and a silver medal to the Incandescent Gas-Light Company, Limited, for the lighting of one of the stalls. There was no adjudication whatever in the electrical section, owing mainly to the want of competent jurors.

EAST LONDON WATER-WORKS COMPANY

The Half-Yearly Assembly of Proprietors was held at the Company's Offices, St. Helen's Place, E.C., last Tuesday, under the presidency of Mr. A. W. GADESDEN.

The SECRETARY (Mr. I. A. Crookenden) read the notice convening the meeting, and the report of the Directors was taken as read (see *ante*, p. 754).

The CHAIRMAN said it was a satisfactory feature in the accounts that they still had an increasing revenue; and there was no reason why their income should not go on increasing in the future as it had done up to the present time. There was an increase in the charges for maintenance; but, as stated in the report, this arose from two causes—there had been heavy repairs to their steam-boilers, and to one of their filter beds; and there had, moreover, been an increase in the price of everything. Coals had risen materially in price, and it was not likely to recede; cast-iron pipes had increased 40 per cent.; stores of all kinds had gone up; and wages were higher. In addition, there was an increase of something like £600 in the rates and taxes. The increase in the expenses was, therefore, not so large as appeared; but some of the increase must, he thought, be regarded as a permanent addition to their expenditure. They had had to oppose the Bill in Parliament promoted by the Midland Railway Company for the purpose of making a line which passed through the Company's impounding reservoirs—the railway actually completely separating the two classes of reservoirs; so that, as originally designed, they had no means of access from one to the other excepting by trespassing over the Railway Company's lines. Their Engineer (Mr. W. B. Bryan) thought the matter was so serious, and that so much damage might be done to their puddled trenches, which served to impound the water, that the Company felt compelled to give the undertaking the most serious opposition. They were in a measure supported in their opposition by the assistance of the Local Government Board; but notwithstanding all their efforts, the Midland Company obtained their Bill—the Committee, he supposed, considering that the railway far outweighed the safety of the water supply to the people in the East London Company's district. They had, however, succeeded in getting stringent protective clauses; but they had to take all the risk, and unfortunately to pay all the costs incurred in protecting their own property. As to the progress of the works, since their last meeting they had been engaged in driving tunnels in the chalk at the Lea Bridge well; and they had now succeeded in getting a fair supply of water. In fact, it seemed as if they would get quite as much as they had expected. The Engineer also thought that the estimate which he (the Chairman) gave the meeting last April, of a supply of 10 million gallons a day from their three wells, might be advanced to 12 million gallons; and the Engineer was sanguine also that, in case of need, the Lea Valley would, by the sinking of wells, produce a further quantity daily of 10 million gallons. Their new engines at Lea Bridge were not in the advanced state they had expected, owing mainly to delay on the part of the contractor, who had had a pressure of work; but they would now shortly be completed. However, all the future of the Company lost its interest when they were brought face to face with the action of the London County Council, whose proceedings of that day week the proprietors had no doubt read with interest. Judging from the ardour of the Council, one would suppose that the opportunities the Company would have of meeting in that room could not be many. They seemed to be inclined to go to work at once; and they proposed to adopt tentative negotiations, so as to be ready to take charge the moment they could get permission to buy the undertakings of the London Water Companies. Whether the Directors of the latter would prove to be as astute as Mr. Clarke represented them to be, and whether the London County Council would be moulded as easily as wax, as Sir Thomas Farrar thought, remained to be proved. At all events, the Board would use their best endeavours to protect the interests confided to them. There was no doubt, from what passed at the meeting of the London County Council, that a great deal would be said as to whether adequate provision was made for future increase in the supply of water. He thought, with respect to their own Company, that they were in a very good position; because from their experience in sinking in the Lea Valley, they were in a position to point to the fact that they could increase their supply of water very considerably. The Engineer encouraged them to believe that they could get about 10 million gallons daily in addition to the 12 million gallons they had obtained from their three wells. This would give them a supply of 20 million gallons daily from the River Lea. Their Engineer also calculated that the amount of 62 million gallons daily was a fair estimate to make of their future resources; and at the present time their supply was only about 41 million gallons. He therefore thought that they could point at all events to being in a very fair position as far as the supply of water was concerned. But the London County Council would be in a much better position in one respect than the Water Companies. They would be much better able to deal with the question of waste—which was a most serious matter—than the Companies were. It now seemed to be considered on all hands rather a meritorious thing to rob a water company by wasting water. In fact, the Companies had been represented as a sort of water dragons, preying on the vitals of the ratepayers; but the moment that the proposed change was made, the whole thing would be reversed. The ratepayers would then be the persons who would suffer from the loss of water; and they might then possibly form themselves into waste inspectors, with the result that many million gallons of water would be saved daily. The Company had a very large and expensive staff exclusively engaged in looking after waste. On this point, their Engineer said: "From June 11 to Oct. 4 the district inspectors for the Metropolitan area reported 18,100 houses wasting water through defective fittings. In the same period the Company's men releathered 7100 taps free of charge. The major part of the waste is wilful; and is most difficult to check. In one metered district, comprising a population of 4900, the rate of consumption from midnight to 3 a.m. was (and is) 36 gallons per head per diem. The total consumption, taking day and night, is 52 gallons per head." This was a monstrous thing to have to deal with. Their Engineer added: "The fittings have all been surveyed, notices served, and repairs executed; but the great waste during the hours of night is proved to be from the wilful leaving of taps running." As he had said, he thought this was a point which would be better dealt with when the water supply was in the hands of the London County Council. There was another point to which he desired to draw their attention—that was that the greater part of the Company's district was outside the London County Council's area. On this point he had asked the Engineer to make a report, and Mr. Bryan said: "The East London Company's supply-area outside London is five times as great as within. Last year seven times as many new supplies were connected outside as were connected inside. Outside, the proportion of supplies to that inside is as 2 to 3; and in ten years time it will probably be equal." There was another point to be considered—namely, the question of population. Their Engineer, writing on this matter, said: "The county borough of West Ham" (which was within the Company's area of supply) "is the tenth in size in England. The three Local Boards of Leyton, Walthamstow, and East Ham have a greater population than Leicester; and the total population outside the Metropolis supplied by the East London Company considerably exceeds the population of Manchester." These were very great facts, and would have to be considered. He did not think that a large population like this would be altogether satisfied to be under the care, so far as the water supply was concerned, of the London County Council. The latter were very anxious to get the supply into their own hands; but he thought the local authorities might wish to have something to say in the matter. The quality of the water supplied by the Company was very satisfactory; and in fact Dr. Frankland had called attention more than once to the fact that the water supplied by the East London Company was superior to that obtained from the Thames. He thought, therefore, they could claim to be in a very fair position with respect to this matter. He concluded by moving the adoption of the report and accounts, and the payment (less income-tax) of a dividend of £3 15s. per cent.

Mr. HERBERT DALTON seconded the motion, which was at once unanimously agreed to.

Votes of thanks to the Engineer, Secretary, and staff, and to the Chairman and Directors terminated the proceedings.

WATER CONSUMERS AND THEIR LIABILITIES.

Fatality through Allowing a Supply of Water to be Cut Off.

On Thursday, the 2nd inst., Mr. WYNNE E. BAXTER, the Coroner for East London, opened an inquiry, at the Poplar Town Hall, respecting the death of Andrew Llewellyn Thomas Eakin, aged 12 weeks, the son of Dr. Samuel Eakin, of No. 451, Manchester Road, Poplar, which was alleged to have resulted from the action of the East London Water Company in cutting off the supply of water to that house. As the Company were unrepresented on the occasion, only formal evidence of identification was taken; and the matter was adjourned. The inquiry was resumed last Wednesday.

Mr. G. KEBBELL appeared for the Company; Dr. CORNER represented the Poplar District Board of Works.

Dr. *Eakin* deposed that on Monday, the 22nd ult., at which date the deceased was in perfectly good heath, the Water Company cut off, the supply to his house because he had refused to pay the water-rate which had always been paid by the landlord. He had been in the house for six years, and his predecessor was there for ten years; and neither of them had ever before been asked to pay the rate. Witness told the Company they could summon him for the amount. As soon as the water was cut off, the stench from the drains became unbearable. He was without water until the following Saturday, when he paid the rate under protest, and the water was put on again the same afternoon. The next day the child was taken ill with vomiting and diarrhœa, and died on the 30th ult.

Dr. *R. Boyle* stated that he was called to see the child; and he found it in a very exhausted condition. It was suffering from choleraic diarrhœa; and death occurred four hours after his visit. In all probability, the illness was set up by the water being cut off.

Dr. *Eakin* (recalled) stated, in answer to Mr. KEBBELL, that four quarters' water-rate were owing at Midsummer last. Two days after the water was cut off he sent a letter to the Company agreeing to pay the rate if the supply was again put on; and he did not then make any complaint. He had a dispute with his landlord as to who was liable for the payment of the rate.

Mr. KEBBELL: Why did you not sue your landlord and settle the dispute? You know the Company could not sue your landlord?

Witness: I know nothing about the Company.

Mr. *G. Sadler* said he was the owner of the house in question, which he let to a Dr. Harvey some 17 or 18 years ago. Dr. Harvey left, and Dr. Eakin then became the tenant; but there was only a verbal agreement. He did not know who paid the water-rate, as he left the management to his agent, Mr. Stocker. About six weeks or two months ago he received a letter from Mr. Stocker saying that Dr. Eakin declined to pay the rate for No. 453, Manchester Road. Witness had heard nothing about No. 451 with respect to the water-rate. He let No. 453 to Dr. Eakin on the understanding that he (Dr. Eakin) paid all the rates.

Mr. *W. Stocker*, House and Estate Agent, of Queen Street, Cheapside, said he had had the management of Mr. Sadler's property for two years, since the death of his father. He had looked over all his father's papers, but could not find any agreement with respect to 451, Manchester Road. He paid the water-rate up to Midsummer, 1889; but finding then that the poor-rate assessment was upwards of £20, he discontinued doing so. Notice was given to Dr. Eakin to this effect; but he refused to pay, and told witness's clerk that he was prepared to fight the Company.

By Mr. KEBBELL: The legal aspect of the case was thoroughly explained to Dr. Eakin, who paid all the taxes for No. 453.

Mr. *J. Crisp*, an assistant-collector in the service of the Company, stated that he endeavoured to collect four quarters water-rate due at Midsummer last from Dr. Eakin, and explained to him that he was

liable. After repeated efforts to obtain the money, a notice was sent on the 10th ult., stating that the supply would be cut off in seven days if the amount owing was not paid. When the time allowed by the notice expired, a report was made to the Directors, and the matter was fully investigated; and the warrant for cutting off the water was signed by either the Chairman or one of the Directors.

Thomas Jones, assistant to Dr. Eakin, said the party walls between Nos. 451 and 453 were knocked away, and there was a plentiful supply of water all the time at No. 453.

Mr. KEBBELL having quoted the Acts of Parliament showing that the occupier of a house was liable for the rate, except where the premises were assessed at less than £20.

The CORONER said the question the jury had to consider was how the water supply came to be cut off. The Act of Parliament distinctly stated that the tenant was responsible for the rate when the assessment was more than £20. There did not appear to have been any haste on the part of the Company in cutting off the water. One would have thought that a person in Dr. Eakin's position would have ascertained what was the law on the question before allowing the Company to take the extreme step they did. He (the Coroner) felt bound to suggest that the stubbornness of Dr. Eakin had caused the child's death.

The jury returned a verdict—"That deceased died from choleraic diarrhœa, consequent on the cutting off of the water supply;" several of the jurors expressing an opinion that the water should not have been cut off before a summons had been taken out.

BIRMINGHAM CORPORATION WATER SUPPLY.

Proposed Extension of the Works.

At last Tuesday's Meeting of the Birmingham City Council, Alderman Sir Thomas Martineau proposed a resolution authorizing the Water Committee to consult with Mr. James Mansergh, C.E., or, failing him, some eminent consulting engineer, as to the further powers to be obtained by the Corporation with reference to additional works and sources of water supply necessary to meet future requirements. He explained that the time was fast approaching when the present borrowing powers of the Committee would be exhausted; and it was necessary, therefore, that they should consider what steps should be taken for obtaining further powers. The need for additional works arose from the marvellous development of the demands on the supply of the department. In 1870, the year in which the Act of Parliament was obtained under which the Shustoke reservoir and works were constructed, the total supply amounted to 2508 million gallons; but in 1889 the supply had risen to 5212 millions—showing that in the nineteen years the supply had more than doubled. In 1870 the supply averaged 6·87 million gallons per day; and in 1889, 14·28 million gallons. Dividing the nineteen years into two periods, it would be found that from 1870, when the supply was 2508 million gallons, it increased to 3612 million gallons in 1880, a growth of 1144 million gallons; and from 1880 to 1889, it increased to 5212 million gallons, or another advance of 1560 million gallons. During the first ten years the increase was something like one-third of a million gallons per day, and in the second period, one-half of a million gallons per day, which might now be taken as the rate at which their requirements grew. Their minimum yield of water at the present time averaged 16½ million gallons per day, and their average supply was less than 14½ million gallons; so that it would be seen that in their minimum they had an ample quantity to meet the average supply. But they must be ready to meet their maximum supply in hot weather and times of drought. Their storeage at present amounted to 500 million gallons, sufficient to afford a supply in times of drought for a period of five months. They might be satisfied if they only had to deal with the present; but it was necessary to look to the future. Probably in four or five years they would reach the average daily supply of 17 or 17½ million gallons, and in dry weather they would reach the maximum of 22 million gallons, and it was for that they would have to prepare. Their minimum yield, increased by that of the Longbridge well, would, they hoped, be equal to meet the average demand; but in 1894, instead of having storeage for five months, it would only be equal to 110 days. Under these circumstances, the Committee thought it advisable to take steps to meet future requirements. The resolution was carried.

The Furnace Gases Company, Limited.—A Company under this title has been registered, with a capital of £50,000, in £50 shares, to carry on the business of extractors of produce from furnace gases, and manufacturers of and dealers in such products, tar distillers, manufacturing chemists, &c. Among the first subscribers are Messrs. R. and J. Dempster, of Newton Heath, Manchester.

Gas Laundry Lectures.—The first of a series of public lectures on "Laundry Appliances for Gas Consumers" was given at the Wartburg Hall, Denmark Hill, on Wednesday and Thursday last, by Mrs. W. Burdett, of Forest Hill. The proceedings were opened by the Rev. J. Martin, who said that, as "cleanliness is next to godliness," he had great pleasure in being present at such a demonstration, as he was sure, from what he had seen, that gas laundry work was only in its infancy. Mrs. Burdett dealt with the troubles ladies have with washerwomen, who, she said, made home miserable by their labour. Laundrymen were still worse off, because they could never rely upon their hands working. Again, ladies would never undertake their own laundry work because of the fatigue and discomfort it entailed. There was a prejudice against machinery; but she did not see why gas laundry machines should not be as popular as cooking-stoves. Of course, the public were not educated up to the uses of gas. It was marvellous what it would do; and on this account the advantages of gas washers, dryers, calenders, and irons would be demonstrated that night. After the lecture was over, several batches of soiled linen were placed in one of Greenall's steam washers, then into rinse and blue, passing on to the gas dryer, by Messrs. H. and C. Davis and Co., of Camberwell, and finally being ironed by gas appliances from the same makers—the whole process occupying exactly 25 minutes. The performance created great surprise; and the lecturer was cordially thanked.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

Electric lighting matters first claim my attention this week. On Tuesday last the Edinburgh Town Council took up the consideration of the subject of introducing electric lighting into the city. Their deliberations were short; the Lord Provost advising them to endeavour to be unanimous in what they did, in order that they might have more effect in Parliament. As a matter of fact, the Council only go into the business in a half-hearted sort of way. The Corporation, having recently become the proprietors of the gas undertakings, do not care to set up an opposing lighting agency, and can only make up their minds to do so in the fear that, unless they take some action, others will come in and do the work for them, obtaining a footing in the city which it would be difficult to dislodge them from. The Lord Provost, in his speech recommending the Council to apply for a Provisional Order, empowering them to supply electricity for lighting purposes, pointed out that the obtaining of an Order did not necessarily involve that the Town Council would become makers of electricity, or that they should themselves supply electric light. It would be quite open to them to arrange with any of the companies which existed for that purpose; and they might divide the city into districts, and employ more companies than one to supply the light. So that to keep their position, which did not involve them in anything they would not otherwise wish to do, they must themselves apply, in the first instance, for a Provisional Order, and after that they could make what arrangement they thought advisable with any Company. It was quite clear that there were a great many people in Edinburgh who desired the electric light. This was followed by the remark that "no doubt their gas supply was excellent," which, I am surprised to say, was received with murmurs of dissent by the councillors. Somehow or other the idea has got abroad that "the gas is not what it used to be"—an idea for which, I am convinced, there is very little, if any, foundation, but which may drive some people to the costly remedy of taking up the electric light. The Lord Provost's motion was adopted; so that Edinburgh will figure at Westminster next spring as an unwilling suppliant for powers to supply electric lighting.

Last night there was an illustration, in the Edinburgh Exhibition, of the disappointing uncertainties of electric lighting. Just after the dynamos had been started for the evening, the pulley driving one of them was discovered to be loose on the shaft; and it had to be taken off—thus causing one of a set of six dynamos to be idle. This was on the smaller of the two engines which drive the electric lighting plant. The other engine was incapable of working to its full capacity, owing, it was said, to some defect in the rope belting; and the result of the double misfortune was that it was only possible to light a little over one-half of the arc lights in the machinery hall. The incident is of importance, as it shows that even with duplicated machinery, as in this case, it is possible to have a breakdown of the lighting system which might be the cause of great inconvenience to users of the light.

At Dundee on Monday the somewhat rare proceeding took place of a prosecution and conviction for stealing gas. The accused, an engineer named James Scott, was charged, and admitted that during the preceding two months he had stolen 1000 cubic feet, or thereby, of gas. Private information led to a domiciliary visit to Scott's house last Saturday night, when it was discovered that he had laid on the gas to his dwelling without the sanction of the Gas Commissioners. In extenuation, he pleaded the illness of his wife, his being out of work, and the fact that his children were afraid to stay in the house after dark. The Magistrate proceeding upon the information that Scott had hitherto borne an excellent character—it is always people of supposed good character who commit such offences—and probably taking into consideration the rarity of the charge, dismissed him with an admonition, which most people will agree was much too small a punishment for a man of Scott's description.

A rather alarming fire took place on Wednesday morning at the North British Chemical Works at Elliot, four miles from Arbroaths where Messrs. John Dobbie, Sons, and Co., of Leith, began only as late as last week to carry on the work of treating residual product, from gas-works. The works are beside the North British Railway; and it is surmised that a spark from a passing engine may have led to the fire. It was discovered about one o'clock in the morning, by the night watchman, whose attention was attracted by several explosions. An underground tar-pit, containing about 22,000 gallons of boiled tar was found to be on fire; and the explosions were due to the ignition of naphtha barrels which had been standing on the top of the tank. What is described as "a sea of fire" rose from the tank. The workmen live in close proximity to the works, and they promptly turned a stream of ammoniacal liquor on to the fire, with the result that within an hour they succeeded in subduing the flames before the contents of the tank were fully consumed. The damage amounts to about £400. This is another, and probably the most striking instance of the peculiar quality of ammoniacal liquor in extinguishing fire.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

When the Glasgow Corporation Gas Committee's minutes were up for consideration at last Thursday's meeting of the Town Council, the question of the contemplated negotiations for the purchase of the works of the Partick, Hillhead, and Maryhill Gas Company excited some remarks which showed a somewhat keen feeling on the part of two or three members of the Council. Bailie M'Lennan asked for an explanation of a paragraph in the minutes referring to this matter. The paragraph referred to a special meeting of the Gas Committee at which they discussed a remit made to them by the Council on the proposals which might be made by the Directors of the Company, with a view to the sale of their undertaking to the Corporation, and to negotiate with them in reference thereto. The minute stated that "the Committee instructed the Town Clerk to intimate to the Company that they were prepared to consider any proposals which the Company might be prepared to submit to them." Bailie M'Lennan was of opinion it had been resolved by the Corporation not to take any step in the matter, and

he objected to any anxiety being shown by the Corporation in the direction of obtaining the Company's works, the more especially as he considered that the concern would not be profitable to them. Mr. M'Laren, Convener of the Finance Sub-Committee, defended the action taken by the Committee. He said that the special meeting of the Committee had not been held for that purpose; but that it had been taken advantage of in order to acknowledge receipt of the Company's letter, and to authorize a reply to it stating that they were willing to receive any offer which the Company might be inclined to make. There was not any intention to press the Company to make any offer. Bailie Mitchell also objected to the Gas Committee displaying any undue haste. According to ex-Bailie Gray, the Gas Committee had only been authorized to receive any communication that the Company might deem it proper to send; but they had not waited to receive a communication from the Company—they had actually gone to them. Mr. M'Laren seemed to think that the Committee had only done a simple act of courtesy in sending their letter. A feeling prevails that if there are to be negotiations for the acquisition of the works by the Corporation, only hard terms will satisfy the buyers. Buying by arbitration does not seem to be contemplated by the Gas Committee.

The ward meetings in connection with the November elections of Town Councillors are already on in full vigour in Glasgow; and in two or three other towns a somewhat brisk beginning has been made. In this city at least four of the sixteen municipal wards have held meetings this week. The Sixth Ward electors met on Thursday evening, and one of their representatives, ex-Bailie M'Laren, in referring to the affairs of the Gas Department, said that the reduction of the hours of labour at the gas-works from twelve to eight per shift involved an increase in wages to the extent of £17,000 in the year; but as the Glasgow Trust had a very large sinking fund, they did not propose to increase the price of gas. He went on to say that a Provisional Order had been obtained which empowered the Corporation to light the city by electricity; and he gave details of the conditions on which the Order had been granted, one of which was that the electric light must be introduced within two years in certain districts. The intention of the Committee was to adopt the low-tension system, and to put the wires under the footpaths, so that the light could easily be installed in warehouses and shops. They were endeavouring to get the best method, so as to give both cheap gas and cheap electric light.

On Thursday night, at one of the municipal ward meetings in Greenock, Bailie Erskine, the Convener of the Corporation Gas Committee, had something to say about gas affairs in that town. In November last, he said, he was appointed to that office in succession to Bailie M'Onie; and the work throughout the year had been somewhat onerous and serious. The Committee had reduced the working hours of the men to eight per day; and by running a railway line into the works, they would be able to save £700 or £800 a year. With the expenditure to which he had alluded, and considering the state of the market for the residual products towards the close of the financial year, it was very satisfactory that they were able to declare so handsome a profit. They must have a certain amount at their credit so as to meet contingencies as they might arise. That, he thought, was the reason—probably not a sufficient reason—why gas was not supplied at cost price. In 1879 the gas profits amounted to £4000; but that year the rate was 4s. 2d. per 1000 cubic feet. It continued at that rate till 1882, when it was reduced to 3s. 9d.; and after continuing thus for five or six years, it was reduced in 1888 to 3s. 6½d., and then last year it was reduced to 3s. 4d. As the market this year did not look so well, and as the state of trade was not so promising as in the previous year, they thought it prudent to stay their hand and keep the rate at 3s. 4d.

The Glasgow pig-iron market has been more or less excited during the past week, and prices of Scotch warrants have fluctuated between 54s. per ton on Monday to 50s. 9d. on Thursday, and up again to 52s. 3d. yesterday. The close in the afternoon was 51s. 9½d.; marking a fall on the week of 2s. 2½d. per ton. The prices of Cleveland and hematite iron moved in sympathy. At present the market is in a very sensitive condition, and is quickly influenced by any rumour concerning the blast furnacemen's demands. There are large withdrawals of iron from the store from day to day.

There is a marked unsettledness in the local coal trade; but prices are certainly slackening. In one mining district, however, an advance of wages has been conceded to the miners.

Woodhouse and Rawson, Limited.—The first annual report of the Directors of this Company (to June 30 last), which was presented at the general meeting of the shareholders held last Friday stated that of the original capital all the ordinary and preference shares had been issued. Of the ordinary shares, one-half of their value remained uncalled. The premiums from the second issue, amounting to £4050, have been placed to a reserve fund. The accounts accompanying the report showed that, after payment of all expenses, and writing off £7421 in reduction of the sum standing to patent account, the credit balance amounted to £61,085. Out of this sum the Directors proposed a dividend at the rate of 15 per cent. per annum on the ordinary, and 8 per cent. per annum on the preference shares, which, together with the interim dividend for the half year already paid at these rates, came to £18,749. Of the balance, amounting to £42,335, the Directors proposed to place to reserve £25,000, out of which £10,000 will be set aside to a goodwill reserve fund, and £15,000 to a general reserve fund, and to apply £1000 to the formation of an employees' pension fund; leaving £16,335 to be carried forward. The Directors did not propose increasing the dividend anticipated in the prospectus, as they thought the prudence of building up reserve funds of a considerable amount would be evident to the shareholders. They furnished more information than is usually contained in an annual report, in order to enable the proprietors to realize the scope and extent of the operations in which the Company are engaged. Their efforts during the past year had, it was stated, been directed to consolidating and extending the several branches of business which had been taken over by the Company. These are of a very comprehensive character; including the manufacture and supply of all articles connected with electricity and electrical engineering, the execution of installations of the electric light, and the testing of new patents relating to electrical science.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 11.

Sulphate of Ammonia.—The market is assuming a firmer tone; and, after £11 10s. to £11 11s. 3d. having been paid at Hull, £11 12s. 6d. is now generally asked. There is a great improvement in the French demand; yet it is principally for spot delivery—French consumers having evidently held back till the last moment, and until their supplies were exhausted. Germany, too, is coming forward a little more freely; but the limits are below those of the French buyers. A fair quantity has also been placed for Belgium. An opinion has been expressed that more sulphate will be used in the coming season, owing to the somewhat unsatisfactory results of nitrate in some of the best districts; and although it may be too soon to be assured of such an event, there are even now not wanting the points favourable to this assumption. There is meanwhile very little forward business passing. Makers do not care to contract on the basis of present values; and speculators apparently are unwilling to execute such limits as may be given by Continental consumers. There are comparatively few prompt parcels on the market to-day.

LONDON, *Oct.* 11.

Tar Products.—There has been some excitement in this market; and it is thought that the higher prices quoted for benzol are the result of purchases being made against "bear" operations. The improvement in creosote and common oils which was expected to follow the stoppage of the blast-furnaces in Scotland, has not so far occurred. On the contrary, these oils are weak and difficult to sell. Some large sales of anthracene have been made during the week, at prices (according to strength) from 1s. 4d. to 1s. 5d. for "A" quality; and from 1s. to 1s. 2¼d. for "B." Pitch continues firm; but no business of any importance has been transacted. Carbolic and cresol continue neglected; but there is some inquiry for forward delivery. Some important contracts for tar have been settled recently at a remarkable difference in price—due, no doubt, to position and quality; the figures varying from 21s. to 30s. 6d. per ton. To-day's values may be taken as follows: Tar, 25s. to 30s. 6d. Pitch, 29s. to 31s. 6d. Benzols, 90 per cent., 4s. 4d.; 50 per cent., 3s. 3d. Toluol, 2s. Solvent naphtha, 1s. 9d. Crude naphtha, 1s. 6d. Creosote, 2¼d. Heavy oils, 3¼d. Carbolic acid, 60's, 1s. 8d. Cresol, 9d. Anthracene, "A" quality, 1s. 5d.; "B" quality, 1s. 2d.

Sulphate of Ammonia.—There has been a most unaccountable falling off in the German demand; but fortunately this has been somewhat counteracted by larger sales to America and better shipments to France. All the same, the article hangs fire; and although the market quotation is to-day £11 10s., it is difficult, if not impossible, to obtain that figure. Large sales have taken place at about £11 5s. Gas liquor is quoted, according to position, at 8s. to 10s. per ton.

Darlington Corporation Gas and Water Supply.—At the meeting of the Darlington Town Council last Thursday, the half-yearly report of the Gas Committee was introduced by Mr. Barron, who said that the balance-sheet was satisfactory in the main, when they considered that the price of coal had increased 33 per cent., while the cost of gas had only been raised 7½ per cent. The gross profit for the half year was £2195; and the net profit (after liquidation charges) was £465. During the half year, they sold 2 million cubic feet of gas more than in the corresponding period of last year. In moving the confirmation of the report of the Water Committee, Mr. Harding stated that the net profit for the half year was £790, and that 2 million gallons more water had been pumped than in the first half of last year. The reports were adopted.

The Lancashire Coal Trade.—The demand for most descriptions of fuel was of a steady character during the past week; and there is no material change in prices lately ruling. Cannel coal of good quality for gas making purposes meets with a ready sale, and prices show great disparity. A good sort of cannel nut can be had for 11s. 6d. per ton; but, though looking well in the heap, the results are not what might be expected. In fact, several Corporation Gas Committees have gone in for a better quality at 16s. 6d. to 18s. 6d., which yields higher results in every way, and consequently is more profitable in the end. Steam and forge coal sells very well; but the demand for shipment shows little improvement yet. Prices at the pits average about 9s. per ton; and delivered at Liverpool, 10s. 6d. to 10s. 9d. per ton. Ordinary descriptions of slack are plentiful; and the prices lately ruling are scarcely maintained; better sorts are about the same. Burgy at the collieries is quoted at 7s. 6d. to 8s. per ton; best slack, 6s. 6d. to 7s.; and commoner sorts from 5s. to 5s. 6d. per ton. House-fire coal, 12s. to 12s. 6d. for best qualities; seconds, 10s. 6d. to 11s.; inferior sorts, 9s. 6d.

The Proposed Extensions at the Colne Corporation Gas-Works.—Mr. Arnold Taylor, one of the Inspectors of the Local Government Board, held an inquiry at the Colne Local Board Offices, last Friday, into an application of the Local Authority for sanction to borrow £22,000 for gas-works extensions. Mr. Varley (the Clerk) at the outset explained that in 1877, when the gas-works were purchased, the quantity of gas made was 27,000,000 cubic feet, while now 58,383,000 were made—an increase of more than 100 per cent. In 1877 the population was 9500; and at present it was estimated at between 17,000 and 18,000. In 1877 the price charged for gas was 4s. 2d. per 1000 cubic feet; and since then it had been reduced until at present it was at 3s. Mr. Simmonds, the Gas Manager, gave evidence as to the new plant which it was proposed to purchase. The main items, he said, were retort-houses, coal-stores, new retorts, purifiers, patent stoking machinery, new gas-holder and tank, condensers, new station meter, sulphate plant, exhauster, new workshops, new mains, and gas stoves and meters. This plant would, he said, cost about £16,263; and the Spring House Estate and property adjoining would be purchased at a price of £3737 for the proposed new works. He added that the cost of production would be considerably lowered by the introduction of the new plant, and a great saving to the ratepayers effected in consequence. The Clerk urged upon the Inspector the necessity of the Local Government Board granting as long a period as possible over which the repayment of the money should extend.

A "Gas Utilizer."—Gas consumers are attracted to the windows of Messrs. Spong and Co., of Holborn, by a novel method of applying the "gas utilizer" (a small piece of flat metal) to the centre of a gas-flame; thereby considerably increasing the illuminating power. A statue of a goddess with a pitcher pours water on to a balanced ⅂-shaped receptacle. The top becoming weighted by the water, falls and lifts the other arm, which in turn also drops. The movement automatically brings the "utilizer" into play; and the public judge for themselves the difference in the light.

Mexborough Gas Supply.—The Mexborough correspondent of the *Leeds Mercury*, writing last Thursday, says: There is considerable opposition to the Mexborough Gas Company at present, owing to the alleged deficiency both as to the quality and quantity of the gas; and the grievance was increased last Sunday owing to the impossibility of seeing to read in the churches and chapels, the gloom being so bad that the Vicar (the Rev. H. Ellershaw) brought the service to an abrupt termination soon after the commencement. A memorial, numerously signed, has been presented to the Chairman of the Local Board, requesting that a public meeting be convened in reference to the matter. It is asked that the Board of Trade should institute an inquiry, with a view to the removal of the monopoly. The price of gas is 3s. 6d. per 1000 cubic feet; and it should be of 14-candle power. Owing to the quality of the gas, many tradespeople are making use of paraffin and petroleum.

Contradictory Medical Testimonial as to the Purity of the Chester Water Supply.—A remarkable condition of things prevails at Chester in regard to the water supply in its bearings upon the health of the city. Typhoid fever having been very prevalent, the Local Government Board sent down Dr. Ballard, who took several samples of water, and submitted them to Dr. Frankland, with the result that they were all said to contain distinct evidence of sewage contamination. At the meeting of the Chester Town Council last Wednesday, a report from Dr. Tidy was read, disagreeing with these conclusions. Dr. Ballard had, Dr. Tidy declared, examined the water from the point of view of a sanitary inspector, who had no special training whatever in chemical analysis. Referring to the samples mentioned in the report, Dr. Tidy proceeded: I say they are waters of remarkable purity. As a chemist, I consider them of excellent quality; as a medical man, I consider them perfectly wholesome, and free from even a taint of suspicion. I consider the result of Dr. Ballard's report . . . to be nonsense. I am sorry to criticise thus strongly a report by my friend Dr. Ballard. I can only repeat that it is the report of a non-chemist, very able in his own line of work (and to that I bear witness myself fully), but who knows nothing about water analysis and the importance of analytical detail. The analyses of the water as given show purity and not impurity; show the absence of pollution, and not its presence." A letter was also read from the Chester Water Company, enclosing a report by Dr. Davies, of the Royal Institution Laboratory, Liverpool, on two samples of water, which were described as soft and pure, and suitable as a beverage and for domestic use.

Shortness of Water at Middlesbrough.—Of all public establishments a fever hospital ought certainly to be provided with a plentiful supply of water; but sufficient care does not seem to have been taken in this respect at Middlesbrough. Last Sunday week there were 50 cases of typhoid fever in the Fever Hospital; and the service of water was not equal to the requirements. Reporting on this matter at a meeting of the Sanitary and Fever Hospital Committee of the Corporation yesterday week, the Borough Surveyor (Mr. E. D. Latham) stated that he had done his utmost to improve the position of affairs. He had written to the Manager of the Water Board (Mr. D. D. Wilson), saying he would advise the Committee to construct a large new storeage tank; but he should expect the Water Board to fill it. He had never known the pressure so feeble as it was at present. Mr. Wilson replied, stating that the cistern at the hospital was capable of holding 175 gallons, and the supply-pipe was only a ¾-inch one; so that both cistern and pipe were totally inadequate for such an institution. If the Committee would authorize him, he would carry out the needful improvements in the fittings without delay. Mr. Latham suggested that the hospital should be connected with a new 6-inch main; and that they should construct a large storeage tank capable of holding 1000 gallons. Mr. Pindeer and Mr. Eaton both complained that they could not get any water at their private houses on Sunday; and Alderman Weighell, Chairman of the Fire Brigade Committee, said he had just had an application for the loan of the fire-engine to pump water from a pond to some of the works; and he had granted it, as the scarcity of water was so great that, unless he had done so, the works would have been stopped. After considerable discussion, the recommendations were adopted; and a Sub-Committee was appointed, with plenary powers, to take what steps they thought necessary in regard to the matter.

Kimberley Water-Works Company, Limited.—The Directors of this Company recommend an interim dividend at the rate of 5 per cent. per annum, free of income-tax, for the half year to June 30 last.

The Redditch Local Board and the Gas Company.—The Redditch Gas Company recently increased the price of gas, and some objection was raised to this proceeding by the members of the Local Board. At the meeting of the latter body last Tuesday, a letter was read from the Secretary of the Gas Company to the effect that the Directors had not advanced the price without careful consideration, and that they felt compelled to adhere to their resolution. The letter also stated that if the Local Board thought they could supply the town with gas cheaper than the Company, the Directors were quite prepared to treat with them for the sale and transfer of their works.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 739.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	10 Oct.	10½	Alliance & Dublin 10 p. c.	10	17–18*	+1	5 16 8
100,000	10	,,	7½	Do. 7 p. c.	10	12½–13½*	+½	5 11 1
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	107–109	..	4 11 9
100,000	20	30 May	8	Bahia, Limited	20	20–22	..	7 5 5
200,000	5	15 May	7½	Bombay, Limited	5	7–7½	..	5 0 0
40,000	5	,,	7½	Do. New	4	5–5⅝	..	5 9 1
380,000	Stck.	14 Aug.	12½	Brentford Consolidated	100	212–217	..	5 12 11
125,000	,,	,,	9½	Do. New	100	155–160	..	5 15 7
220,000	20	11 Sept.	11½	Brighton & Hove Original	20	40–42	..	5 9 6
320,000	20	28 Mar.	11½	British	20	43–45	..	5 0 0
50,000	10	11 Sept.	11	Bromley, Ordinary 10 p. c.	10	18–20	..	5 10 0
39,000	10	,,	8	Do. 7 p. c.	10	13–14	..	5 14 3
328,750	10	13 June	8	Buenos Ayres (New) Limited	10	12½–13½	..	5 18 6
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	103–106	..	5 13 2
150,000	20	14 Aug.	8	Cagliari, Limited	20	25–27	..	5 18 4
550,000	Stck.	10 Oct.	13½	Commercial, Old Stock	100	245–250*	..	5 10 0
130,000	,,	,,	10½	Do. New do.	100	198–203*	+3	5 5 11
130,000	,,	27 June	4½	Do. 4½ p. c. Deb. do.	100	119–124	..	3 12 7
557,320	20	13 June	13	Continental Union, Limited	20	49–51	..	5 1 11
242,680	20	,,	13	Do. New '69 & '72	14	33–35	..	5 4 0
200,000	20	,,	10	Do. 7 p. c. Pref.	20	39–41	..	5 17 7
75,000	Stck.	25 Sept.	10	Crystal Palace District	100	190–200	..	5 0 0
234,060	10	16 July	—	European, Limited	10	18–20	..	—
120,000	10	,,	—	Do. New	10	18–20	..	—
354,060	10	,,	—	Do. do.	7½	14–15	..	—
5,470,620	Stck.	14 Aug.	13	Gaslight & Coke, A, Ordinary	100	253–237	+½	5 9 8
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	98–101	..	3 19 3
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	250–255	..	3 18 5
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	119–123	..	4 1 3
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	177–182	..	4 2 5
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	164–168	..	4 3 4
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	250–255	..	3 18 5
1,061,150	,,	13 June	4	Do. 4 p. c. Deb. Stk.	100	115–120	..	3 6 8
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	123–128	..	3 10 4
650,000	,,	,,	6	Do. 6 p. c. do.	100	161–166	..	3 12 3
3,800,000	Stck.	15 May	12	Imperial Continental	100	220–223	..	5 7 7
75,000	5	13 June	6	Malta & Mediterranean, Ltd.	5	5⅛–5⅜	..	5 4 4
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	100	109–111	..	4 10 1
541,920	20	13 June	6⅓	Monte Video, Limited	20	19½–20½	..	5 6 10
150,000	5	30 May	10	Oriental, Limited	5	9–9½	..	5 5 3
60,000	5	25 Sept.	7	Ottoman, Limited	5	5–5½	–¼	5 7 3
166,870	10	16 July	4	Pará Limited	10	3¼–4¼	..	3 17 9
				People's Gas of Chicago—				
420,000	100	2 May	6	1st Mtg. Bds.	100	98–102	..	5 17 8
500,000	100	2 Dec.	6	2nd Do.	100	95–100	..	5 0 0
150,000	10	10 Oct.	10	San Paulo, Limited	10	15–15*	+1	5 5 0
500,000	Stck.	28 Aug.	13½	South Metropolitan, A Stock	100	283–288	+2	4 12 0
1,350,000	,,	,,	11⅓	Do. B do.	100	227–232	..	4 19 1
141,500	,,	,,	12	Do. C do.	100	235–245	..	4 17 11
650,000	,,	27 June	5	Do. 5 p. c. Deb. Stk.	100	142–147	..	3 8 0
60,000	5	11 Sept.	11½	Tottenham & Edm'nton, Orig.	5	11–13	..	4 8 5
				WATER COMPANIES.				
728,446	Stck.	13 June	9½	Chelsea, Ordinary	100	269–274	..	3 9 4
1,720,560	Stck.	10 Oct.	7½	East London, Ordinary	100	209–213*	+2	3 10 5
544,440	,,	27 June	4½	Do. 4½ p. c. Deb. Stk.	100	140–145	..	3 2 0
700,000	50	13 June	9	Grand Junction	50	120–124	..	3 12 7
708,000	Stck.	14 Aug.	10½	Kent	100	270–275	..	3 16 4
1,013,800	100	27 June	9½	Lambeth, 10 p. c. max.	100	249–254	..	3 14 9
406,200	100	,,	7½	Do. 7½ p. c. max.	100	197–202	..	3 14 3
225,000	Stck.	25 Sept.	4	Do. 4 p. c. Deb. Stk.	100	120–124	..	3 4 6
500,000	100	14 Aug.	12½	New River, New Shares	100	361–366	..	3 6 3
1,000,000	Stck.	31 July	4	Do. 4 p. c. Deb. Stk	100	125–128	..	3 2 6
902,300	Stck.	13 June	6	S'thwk & V'xhall, 10 p. c. max.	100	170–174	..	3 9 0
126,500	100	,,	6	Do. 7½ p. c. do.	100	158–163	..	3 13 7
1,155,066	Stck	13 June	10	West Middlesex	100	265–270	..	3 14 1
						*Ex.div.		

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAYS.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH.
Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, NEWTON GRANGE, NEAR DALKEITH, } SCOTLAND.

JAMES LAWRIE & CO. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
, See Advertisement p. 771 of last week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

J. & J. BRADDOCK, Globe Meter Works Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock, Oldham."

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM LONDON." TELEPHONE No. 2698.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS,

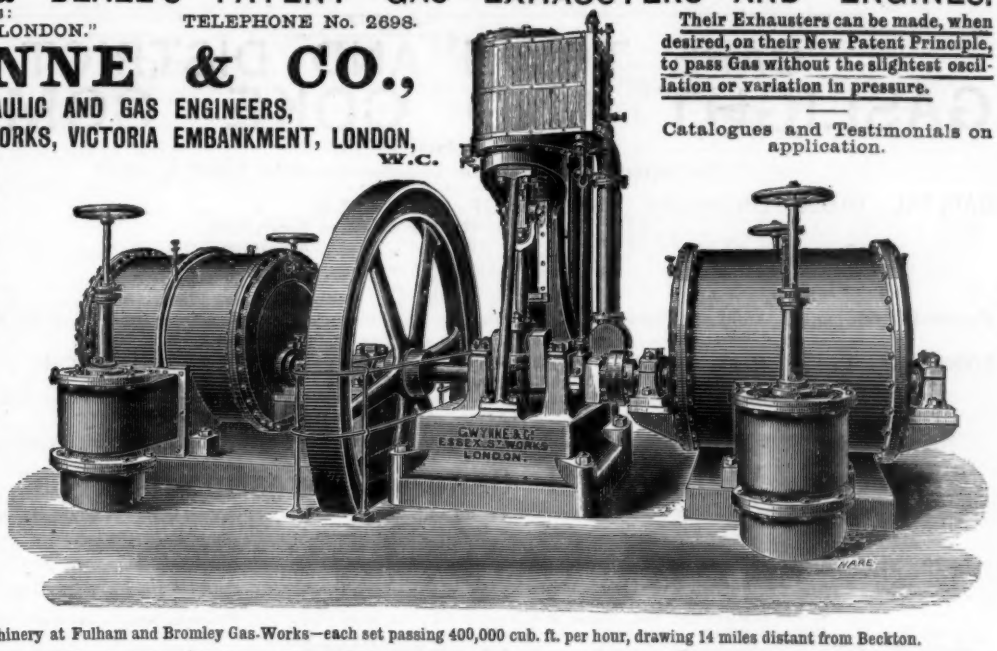
ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C.

Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co. for Gas Exhausters, &c.

They have completed Exhausters to the extent of 29,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.



Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

Catalogues and Testimonials on application.

Exhausting Machinery at Fulham and Bromley Gas-Works—each set passing 400,000 cub. ft. per hour, drawing 14 miles distant from Beckton.

HUTCHINSON BROTHERS, Barnsley, Gas Engineers and Contractors, Makers of Wet and Dry Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Lead Saturators, Tanks, &c., Tools and Sundries.

COZE'S Automatic Apparatus for CHARGING AND DISCHARGING GAS-RETORTS. For Illustrated Advertisement of this System, see p. 780.

Inquiries should be addressed to THE AUTOMATIC COAL-GAS COMPANY, LIMITED, 86-88A, LEADENHALL STREET, E.C.

TUBES.

FOR Gas, Steam, and Water; Galvanized White Enamelled, and Hydraulic Tubes, &c. JOHN SPENCER, Globe Tube Works, WEDNESBURY, and 14, Great St. Thomas Apostle, LONDON.

WANTED, by the Advertiser, a Situation as METER INSPECTOR, COLLECTOR, or WORKING MANAGER of medium-sized Gas-Works. Has had 8½ years' experience in the general routine of Gas-Works (Engine and Exhauster). Is a practical Smith. Aged 27. Married.

Apply to W. D. ASHLEY, 10, Albion Street, OLDBURY.

WANTED, at once, a steady Man, as STOKER. Wages, £1 1s. per week. Constant employment to a suitable Man.

Apply, stating age, to the MANAGER, Gas-Works, FORMBY.

WANTED, immediately, by a Gas Com- pany, a respectable, industrious YOUTH as Improver in the Gas-Fitting Department. Permanent employment to a smart hand.

Apply to No. 1870, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a good Man, able to take charge of a small Gas-Works carbonizing 300 tons of coal a year. He will be required to assist present Man with the view of taking full charge in a few months. Age not over 40. Wages, while assisting, 2os. a week.

Apply, by letter, to No. 1869, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a good second-hand GAS EXHAUSTER, to pass 2000 cubic feet per hour. Also a good second-hand GAS-ENGINE (5-man, or ½-horse power).

Send full particulars and price to No. 1868, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GUILDFORD GASLIGHT AND COKE COMPANY.

THE Directors are prepared to receive TENDERS for the supply and affixing of a GAS EXHAUSTER, with ENGINE complete, to pass 30,000 feet of Gas per Hour; also for the supply of one STEAM-BOILER, 20 ft. by 5 ft 6 in.

All tenders, to be accompanied by plan and specification, and to be endorsed "Tender for Exhauster," or "Boiler," to be delivered to the undersigned not later than Oct. 21 inst.

Any further required particulars on application to Mr. Lloyd, Gas-Works Manager, Guildford.

By order,
WILLIAM LONGWORTH,
Secretary.

Gas Offices, Guildford,
Oct. 10, 1890.

TO INVESTORS.

THE Directors of the Town and County of Poole Gas and Coke Company, Limited, have FOR DISPOSAL 23 4 per cent. PREFERENCE "C" SHARES of £10 each.

This being a safe Investment, early application should be made to the Secretary, who will supply all particulars.

By order.
WILLIAM DAVIS, Secretary.

Gas Office, Poole, Oct. 7, 1890.

LITTLEHAMPTON GAS COMPANY, LIMITED.

ONE Hundred and Sixty £5 Shares, being the concluding portion of the Additional Capital required on the completion of the New Works, will be Sold by Auction, by CHAS. HY. KNIGHT, at the "Norfolk" Hotel, Littlehampton, in lots of Four Shares each, on Monday, the 3rd of November, 1890, at Three o'clock in the afternoon.

Full particulars and conditions of sale can be obtained of Mr. ARTHUR SNEWIN, the Company's Secretary, High Street, LITTLEHAMPTON; at the "NORFOLK" HOTEL, LITTLEHAMPTON; or at the Offices of the Auctioneer LITTLEHAMPTON.

CORPORATION OF NELSON.

TO MANUFACTURING CHEMISTS.

THE Nelson Gas Committee are pre- pared to receive TENDERS for the purchase of the surplus TAR produced at their Works during the year ending Oct. 31, 1891.

Particulars and forms of tender may be obtained on application to the Gas Manager, Mr. William Foster.

Tenders, endorsed "Tar," to be sent to me on or before Tuesday, Oct. 28.

By order,
R. M. PRESCOTT,
Town Clerk.

Town Hall, Nelson, Oct. 7, 1890.

ULVERSTON LOCAL BOARD.

TENDERS FOR COAL.

THE Gas and Water Committee invite TENDERS for the supply of 1000 tons of best screened GAS COAL, to be delivered between December, 1890, and June, 1891, in such quantities as may be required by the Manager.

Parties tendering must give full particulars of the Coal they propose to supply, and name the pit from which it will be raised.

Further information and forms of tender may be obtained on application to the undersigned.

Tenders to be sent in not later than the 30th inst., addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Coal."

The Committee do not bind themselves to accept the lowest or any tender.

JNO. SWAN,
Engineer and Manager.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Shareholders of the above Company will be held at the Offices of the Company, 30, Gracechurch Street, in the City of London, on Tuesday, the 4th day of November next, at Three o'clock in the afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 30th day of June last, to declare a Dividend, and to transact the General Business of the Company.

The Transfer Books will be closed from the 22nd of October to the 4th of November next, both inclusive.

By order of the Board,
ALFRED LASS, Secretary.

Offices: 30, Gracechurch Street,
London, Oct. 7, 1890.

PURIFYING OXIDE.

THE Dukinfield Local Board have on SALE 50 tons of SPENT OXIDE, samples of which may be had on application; and they require TENDERS for 50 tons of FRESH OXIDE.

Offers and tenders to be sent in by Saturday, the 25th of October, 1890.

HARRISON VEEVERS,
Engineer and Manager.

TIPTON GAS-WORKS.

TO GASHOLDER MAKERS.

THE Gas Committee of the Tipton Local Board are prepared to receive TENDERS for the construction and erection of a DOUBLE LIFT TELESCOPIC GASHOLDER, 100 feet diameter by 25 feet deep, with Wrought-Iron Guide-Framing.

Drawings and specification may be seen, and other particulars obtained, at the Gas-Works (on and after the 18th inst.) on application to Mr. Vincent Hughes, the Engineer.

Sealed Tenders, endorsed "Tender for Gasholder," to be sent to me the undersigned not later than Three p.m. on Monday, the 27th inst.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
GEO. M. WARING,
Clerk to the Board.

Tipton, Oct. 11, 1890.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 4th day of November next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors, a Dividend declared for the Half Year ended the 30th of June last, and the usual ordinary Business of such Meeting transacted.

Notice is hereby also given, that the TRANSFER BOOKS WILL BE CLOSED from the 21st inst. to the 4th of November, both days inclusive.

By order of the Board,
R. S. GARDINER, Secretary.

30, Clements Lane, Lombard Street,
London, E.C., Oct. 13, 1890.

HENRY PALFREY STEPHENSON Deceased. Pursuant to the Act of Parliament 22 and 23 Victoria chapter 35, intituled "An Act to further amend the Law of Property and to relieve Trustees" Notice is hereby Given that all CREDITORS and persons having any claims or demands upon or against the Estate of HENRY PALFREY STEPHENSON, late of The Hermitage, Duppas Hill, Croydon in the county of Surrey, Civil Engineer deceased (who died on the 30th day of April last and whose will with three codicils thereto was proved by Emily Rose Stephenson Charles Gandon and Alfred Lass the executors therein named on the 13th day of June last in the Principal Registry of the Probate Division of her Majesty's High Court of Justice) are hereby required to send in the particulars in writing of their claims and demands to us the undersigned the solicitors for the executors on or before the 16th day of November next: and Notice is hereby also Given that after that day the said executors will proceed to distribute the assets of the deceased among the parties entitled thereto having regard only to the claims of which the said executors shall then have had notice and that they will not be liable for the assets of the said deceased or any part thereof so distributed to any person of whose debt or claim they shall not then have had notice. Dated this 9th day of October 1890.

WILKINS BLYTH DUTTON and HARTLEY
112, Gresham House, Old Broad Street, E.C.
Solicitors for the Executors.

The List opens this day Tuesday, the 14th October, and will close on or before Friday, the 17th October, both for Town and Country.

THE CAPE TOWN AND DISTRICT GASLIGHT AND COKE COMPANY, LIMITED.

Incorporated under the Companies Acts, 1862 to 1890.

CAPITAL: 10,000 ORDINARY SHARES OF £10 EACH £100,000

Payable 10/- per Share on Application.
£2 „ „ Allotment.
£2 10/- „ „ 25th Nov., 1890.
£2 10/- „ „ 26th Jan., 1891.
£2 10/- „ „ 25th March, 1891.

Payment in full may be made on Allotment, in which case interest at the rate of 5 per cent. per annum on the sums prepaid will be remitted by cheque ten days after Allotment.

1000 SIX PER CENT. FIRST MORTGAGE DEBENTURES OF £50 EACH . . £50,000

(REPAYABLE AT PAR ON THE 1ST NOVEMBER, 1910.)
Interest payable 1st May and 1st Nov. Payable 50 per cent. on Application, and the balance on the 1st Nov., 1890.

TOTAL SHARE AND DEBENTURE CAPITAL . . £150,000

Of which 2000 Ordinary Shares have been subscribed for in Cape Town, and 1233 will be allotted to the Vendors in part payment.

The Gas, Water, and General Investment Trust, Limited,

Of Winchester House, Old Broad Street, London, E.C., are authorized to receive Subscriptions for the above Mortgage Debentures and the balance of the Share Capital.

Directors:

IN LONDON.

The Hon. HENRY NOEL, Director Gaslight and Coke Company, 17, Westbourne Terrace, London, W. (CHAIRMAN).
JOHN BOUSTEAD, Esq., Director Lambeth Water-Works, 31, Craven Street, Strand, London, W.C.
R. A. FAIRCLOUGH, Esq., Messrs. B. G. Lennon & Co., 14, Bunhill Row, E.C. Merchant, London, and Cape Town.
HORACE REGINALD SAVORY, Esq., Director Goldsmiths' Alliance, Limited, 11 & 12, Cornhill, London, E.C.

IN CAPE TOWN.

JAMES WILLIAM ATTWELL, Esq. (of Messrs. Attwell & Co., Merchants), Cape Town.
JOHN WESLEY WELLS, Esq., Merchant, 82, Strand Street, Cape Town.
(An additional Cape Town Director will join the Board after Allotment.)

Brokers:

Messrs. FOSTER & BRAITHWAITE, 27, Austin Friars, London, E.C.
Messrs. COLEMAN & MAY, 2, Tokenhouse Buildings, London, E.C.

Bankers:

IN LONDON.

THE NATIONAL PROVINCIAL BANK OF ENGLAND, LIMITED, *and Branches.*
LLOYD'S BANK, LIMITED, *and Branches.*

IN CAPE TOWN.

THE STANDARD BANK OF SOUTH AFRICA, LIMITED.

Solicitors:

Messrs. PAINE, SON, & POLLOCK, 14, St. Helen's Place, London, E.C.

Auditors:

Messrs. DELOITTE, DEVER, GRIFFITHS, & Co., Lothbury, London, E.C.

Consulting Engineers:

Messrs. STEVENSON & BURSTAL, MM. Inst. C. E., 38, Parliament Street, Westminster, London, S.W.

Secretary and Offices:

J. A. KELMAN, 251, Winchester House, London, E.C.

PROSPECTUS.

THIS COMPANY has been formed to purchase and amalgamate the Cape Town Gaslight Company, Limited, and the South African Gas Company Limited.

The Cape Town Gaslight Company, Limited, was formed in 1844, and has always paid good dividends. The Works of the South African Gas Company, Limited, have just been completed, and will supply the important residential suburbs of Cape Town from Woodstock to Wynberg (see Map annexed to the Prospectus).

The Directors, at the request of the Gas, Water, and General Investment Trust, Limited, instructed Mr. Alfred Lass, F.C.A., of 30, Gracechurch Street, E.C., and Messrs. Stevenson and Burstal, MM. Inst. C. E., Consulting Gas Engineers, of 38, Parliament Street, Westminster, S.W., who are experts in their respective professions, to proceed to Cape Town, with a view of reporting upon the present condition and future prospects of these undertakings.

With respect to the condition of the buildings and plant, Messrs. Stevenson and Burstal report as to the

CAPE TOWN GASLIGHT COMPANY, LIMITED:—

"The Plant and Buildings are in very good condition. The latter are constructed chiefly of stone, in a substantial manner, and the former has been mostly erected by well-known firms, and has been very carefully kept in repair, and not anything is required to be spent upon either works, apparatus, or main pipes, to enable them to earn the *same* revenue in the future as in the past."

"Generally we are of opinion that the works and plant of this Company are in good condition for earning the same revenue as in past years without any Capital expenditure being required; that the undertaking is well worth acquiring at the proposed amount; and that, in view of the rapid growth of the business, the purchasers have made an exceptionally good bargain."

As to the

SOUTH AFRICAN GAS COMPANY, LIMITED:—

"The buildings are erected in a first-class manner. They are built of local bricks, laid in cement mortar, and the roofs covered with corrugated iron sheets (the usual method of the Colony), except the Manager's residence, which is boarded and slated."

"We wish to bear testimony to the very efficient manner in which Mr. Arnott, the Resident Engineer, has carried out the duties of his post; and we believe that it is entirely due to him that the work has been done so satisfactorily."

As to the financial position of the Cape Town Gas Company, Mr. Lass reports an average net profit for the last five years of £6150 per annum. The detailed reports of Mr. Lass and Messrs. Stevenson and Burstal can be seen at the Office of the Company.

The price to be paid for the two undertakings is £125,000, leaving £25,000 for working capital and extensions.

The estimated net revenue of the Amalgamated Company, as given in the above-mentioned reports, is £12,694 per annum, which will admit of a dividend of 9 per cent. on the Ordinary Shares, after providing for interest on the Debentures.

A portion of this revenue, however, will only be obtained after certain extensions and improvements, recommended by Messrs. Stevenson and Burstal, have been carried out, so that Shareholders must not expect the first year's results to be so favourable.

The Vendors pay the expenses of the Company up to the date of the Allotment, and the Company will receive the profits of the Cape Town Gas-Works from the 1st October, 1890.

The Contracts entered into are as follows: (1) A Contract between the Cape Town Gas Company, Limited, and Henry Sampson King, dated the 18th day of August, 1890. (2) A Contract between the South African Gas Company, Limited, and John Hutchinson, dated the 11th day of August, 1890. (3) A Contract between Henry Sampson King and John Hutchinson, of the one part, and Thomas Duncan, on behalf of the Company, of the second part, dated the 7th day of October, 1890.

These Contracts, as well as the Articles and Memorandum of Association, and the Accountant's and Engineers' reports, may be seen at the Office of the Company. There are also various Contracts which have been entered into by the Cape Town Gas Company with Consumers, Municipalities, Contractors and others, which the Company will take over. These are mostly referred to in Mr. Lass's report, and appendix thereto. The Vendors have also entered into arrangements with various parties, to none of which the Company is a party. In case any such Contracts and Arrangements be deemed Contracts within the meaning of Section 38 of the Companies Act, 1887, or Contracts to the disclosure of which applicants for Shares may be considered to be entitled, they shall be deemed to waive the insertion of dates and names of the parties to any such Arrangements or Contracts, and all rights to any further disclosure, and must accept the above statement as a sufficient compliance with the said Section 38, or otherwise.

It is intended to apply in due course for a Stock Exchange official quotation.

In the case of the full amount applied for not being allotted, the surplus of the Deposit paid on application will be applied towards the amount due on allotment. Where no allotment is made, the Deposit will be returned in full.

Prospectuses, and Forms of Application for Shares and Debentures, can be obtained from the Brokers, or Bankers, or at the Office of the Company

LONDON, *October* 10, 1890.

EXTRACT from the Harrogate Gas Company's Report, dated the 5th of February, 189 : Coal consumed, 3600 tons. Gas made, 92,880,000 feet; ditto sold, 84,980,000 feet; ditto unaccounted for, 8,000,000 feet; quantity made per ton, 10,800 feet; ditto sold, 9869 feet. Illuminating Power, 16·1 candles. Coals used, Brancepeth. Owners, Strakers and Love, Newcastle-on-Tyne; who have also Brandon Hutton Seam Unscreened Gas Coal. Analysis, 10,500 cubic feet per ton; Illuminating Power, 16·2 candles.

SULPHURIC ACID delivered in Manufacturers' Tanks or Carboys.
Prices on application to HARDMAN and Co., Miles Platting, MANCHESTER.

TAR and Liquor wanted.
BROTHERTON AND Co., Commercial Buildings, LEEDS.

WANTED, to purchase Gas Carbon, delivered at nearest Station to Gas-Works, in quantities of not less than 4 tons.
Address, stating price per ton and quantity, No. 1766, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BENTLEY & CO.
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FOR Batteries, Bells, Wires, and Special Electrical Apparatus, address the best house 17, NEWTON STREET, PICCADILLY, MANCHESTER.

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MRS. BURDETT (Laundry Instructor) is open to ENGAGEMENTS for LECTURING on "LAUNDRY APPLIANCES for GAS CONSUMERS," demonstrating the new Steam-Washers, which cleanse Linen in Ten minutes, without Rubbing, Scrubbing, Boiling, or Maiding. Fixtures: Wartburg Hall, Denmark Hill, Oct. 8 and 9; Rampant Horse, Norwich, Oct. 10 and 11 (second lecture); St. George's Hall, Wandsworth, Oct. 28 and 29.
Apply for terms to 32, Melford Road, FOREST HILL

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The Invention consists of a very simple method of securing the Plug of a Cock from interference after it has been set to pass the quantity of Gas needed; and also, when required for preventing a supply of Gas being obtained, as the Cock may be secured or locked at any point from "full open" to "closed." It is, therefore, adapted for either a Consumer's adjustable Regulator, or a Company's Self-Locking Main Cock, to prevent the necessity for the removal of the Meter when the supply of Gas is discontinued.
Address No. 1865, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO INVENTORS AND PATENTEES.
MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
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Results of Tests of Dry Gas-Meters (Section III.) of the Glasgow Philosophical Society's Gas Exhibition, as per London "Gas Journal," May 10, 1881.

	ALDER & MACKAY.	W. & B. Cowan.	G. Glover & Co.	James Keith.	D. B. Peebles & Co.
Total of Fast Tests . .	47·2	6·9	33·6	62·3	53·7
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	72·5	124·3	76·7	93·7	92·2

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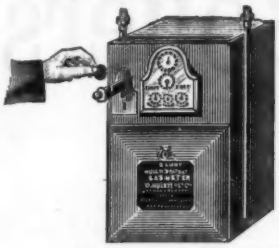

This Meter has a simple Automatic arrangement fitted, whereby, upon the insertion of a shilling, a supply of gas can be obtained, and which is cut off on the quantity paid for being consumed. The Meter gives warning when the quantity is nearly exhausted, so that another shilling may be inserted. There is, however, no occasion to wait until this happens, as a second shilling can be inserted after two-pennyworth of the first shilling has been consumed.

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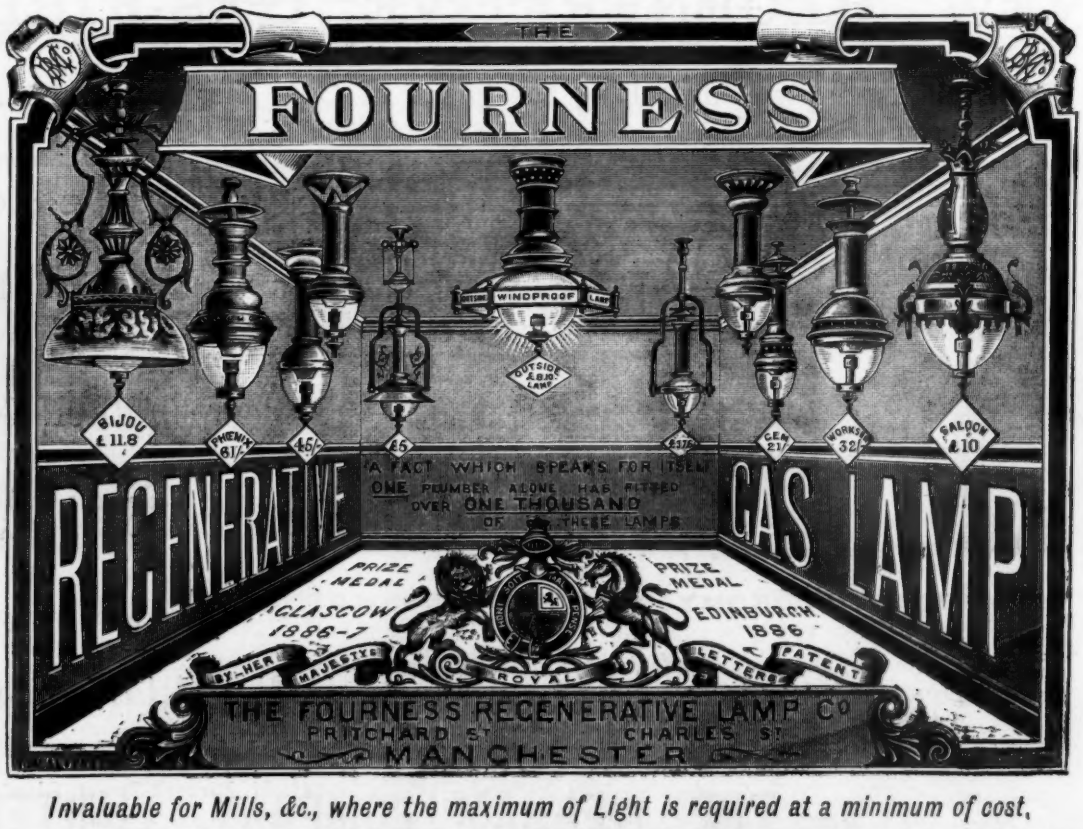

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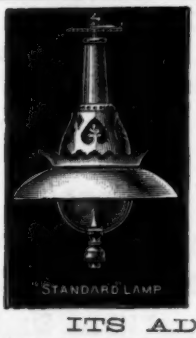

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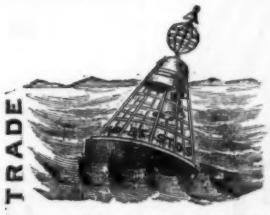

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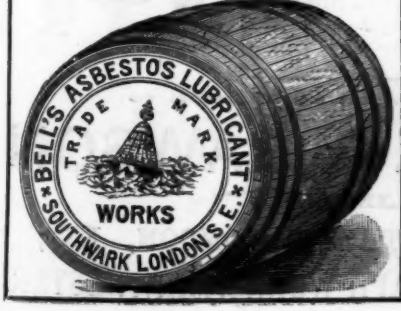

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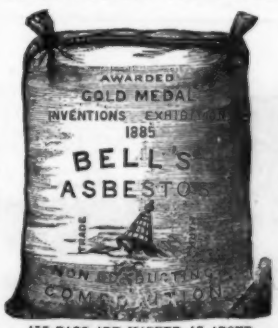

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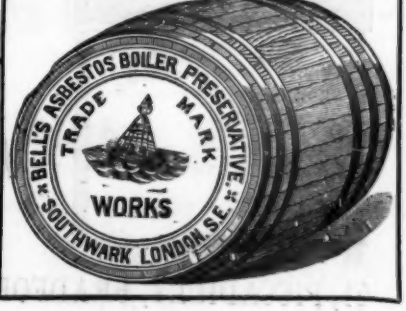

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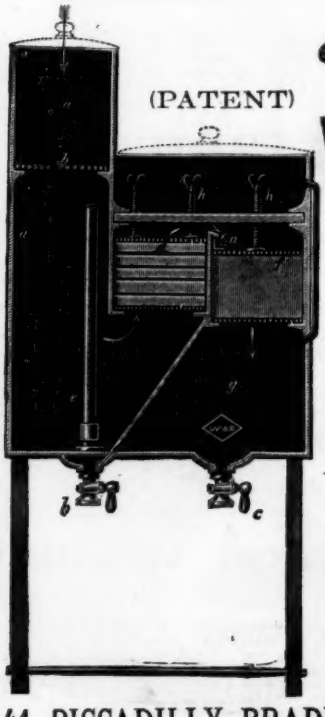

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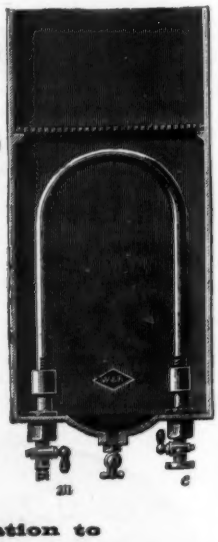

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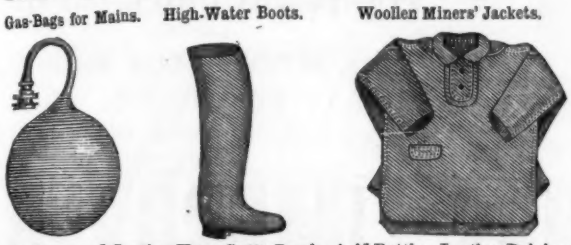

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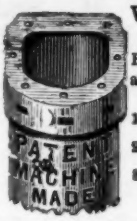

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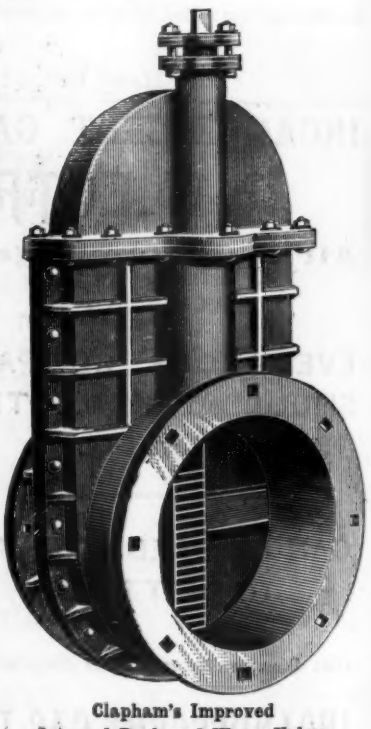
SILVER MEDAL, Inventions Exhibition, 1885.



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